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OF THE

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AUGUST, 1911.

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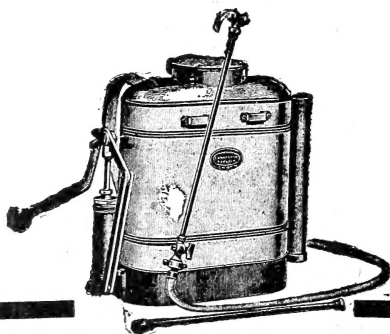


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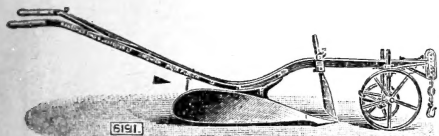


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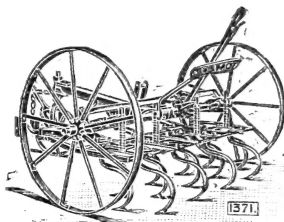
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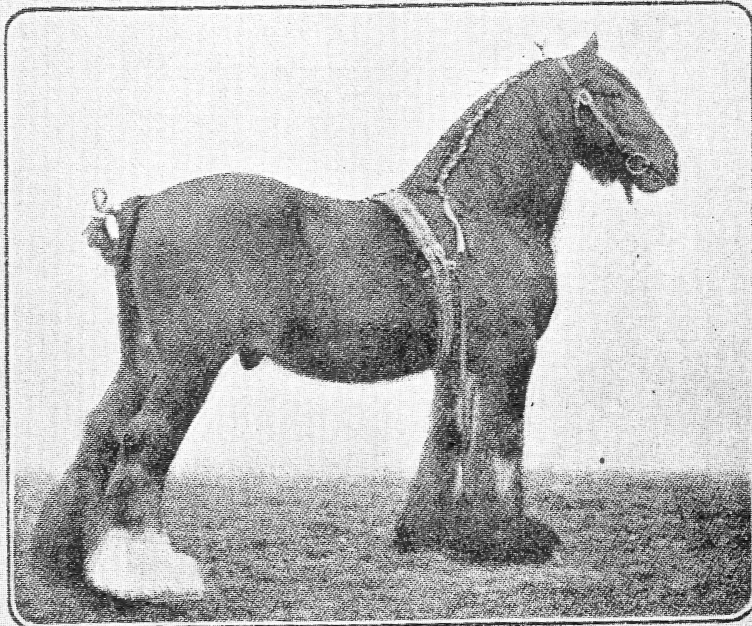
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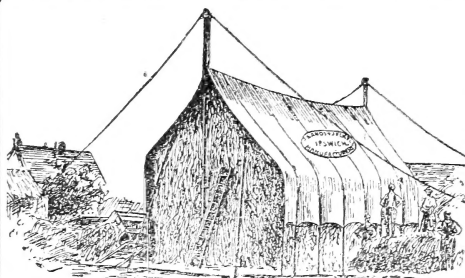
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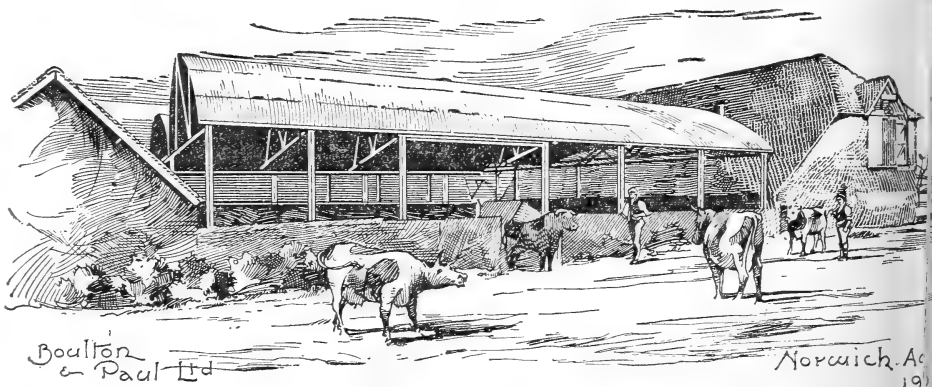
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Vol. XVIII. No. 5.

AUGUST, 1911.

REPORT OF THE DEVELOPMENT COMMISSIONERS.

THE Development Commissioners, who were appointed under the Development and Road Improvement Funds Acts, 1909 and 1910, have recently issued a Report [H.C. 199. Price 3d.] on their proceedings during the period from the 12th May, 1910 (the date of their appointment), to the 31st March, 1911. In view of the fact that a substantial proportion of the Fund established by these Acts is to be devoted to the promotion of agriculture, forestry, and rural industries, the Report is of great interest to agriculturists.

The opening portion of the Report is devoted to a statement of the general principles governing the Commissioners' action, apart from the procedure laid down in the Act of 1909.

It is stated that: "The first of these principles is that, to deal satisfactorily with many of the purposes mentioned in the Act of 1909, it is absolutely necessary to work on a comprehensive policy, which shall provide for and take account of the whole of at least one of the three main administrative divisions of the United Kingdom (viz., England and Wales, Scotland, and Ireland), and shall, wherever possible, be based on a survey of the position and needs of the whole kingdom in relation to that particular subject. Take, for instance, the very important question of research in agricultural science. Numerous applications for advances from the Development Fund for different branches of research and

pieces of research work were expected, and have, in fact, been made by bodies, institutions, and associations all over the kingdom. It seemed to the Commissioners that there would inevitably be waste of energy and money if these applications were simply taken one by one as they arrived, and advances recommended to those institutions which made out a good case for themselves, irrespective of other institutions and the work done by them. It is probably neither desirable nor possible to prevent all overlapping and duplication of work, and the Commissioners realise that individual investigators and institutions cannot and ought not to be dragooned into uncongenial tasks. But looking to the vast amount of work still to be done, they think that any advances from the Fund for this purpose should be made on a coherent and comprehensive scheme, covering as wide an area as possible. The result of the absence of such a plan might well be that research work subsidised from public funds would be unnecessarily duplicated, or that one institution would undertake some enticing problem with which it was fitted to deal, but not so well fitted as another institution in a different part of the country, or that there would be concentration of effort upon one part of the field of agricultural research, while other parts, no less important scientifically and economically, but for some reason less attractive, were left neglected and unexplored.

"Agricultural research has been taken as an example, but it will be obvious that similar considerations apply to other purposes for which advances may be made from the Fund. The Commissioners do not lay it down as a hard-and-fast rule that under no circumstances, however special, will they recommend an advance from the Development Fund apart from an examination of all possible or probable applications of the same nature or apart from a general scheme applicable to the whole country or a large part of it; and the necessity of such a scheme varies with the purpose for which advances are desired. But, for the reasons briefly indicated above, they feel that as a rule an application should be considered not simply and entirely as a disconnected unit, but in the light of a policy which takes account of the requirements of a wider area than a single district or institution."

In addition to this general policy, the Commissioners point

out that they do not think that it would be consistent with their duty to recommend an advance from the Development Fund until a fairly detailed scheme for the expenditure of the money is framed and approved, and that they do not propose, as a general rule and subject in certain cases to considerations of practical convenience, to recommend advances from the Development Fund in relief of existing expenditure, whether from Parliamentary votes, local rates, or other sources. They propose to proceed rather on an opposite plan. So far from recommending advances in relief of existing expenditure, they contemplate using the Fund, within reasonable limits, as a means of provoking expenditure from other sources.

Policy in Regard to Agricultural Development.—Having regard to the amount of the Development Fund, they propose to deal with the problem of agricultural development by devoting their attention principally to three lines of action. They aim first at increasing the amount and quality of the product of agriculture by assisting the extension of a system of scientific investigation and research, and, with it, of a system of education which will, so far as possible, ensure that the results of investigation and research are known and utilised in practice; and secondly, they aim at increasing the variety of production, by placing the cultivator in a position to know whether he can add certain new crops and industries to the existing number with a reasonable probability of profit. Finally, looking at the problem from a rather different and more strictly commercial point of view, they propose to encourage in particular the organisation of co-operation—a subject which is expressly named in the Act.

It is not really possible immediately to do a great deal in regard to the first and third of these three lines of action by the simple process of spending a great deal of money, for the reason that there are not the men available. Nothing has impressed the Commissioners more than the clearness with which the fact has appeared that the first condition of any considerable progress in these ways is the creation of a trained staff. It is useless to expect that immediate results of real value can be obtained on a large scale merely by expenditure. One example is sufficient: the number of men really qualified to conduct agricultural research in this country

is at present exceedingly small, and it obviously cannot be increased at a moment's notice.

The problem of increasing the variety of production is likely to raise difficult questions both of principle and practice. It is enough at this early stage to name flax, hemp, tobacco, and beet as particular crops to which the Commissioners propose to give attention, with a view to ascertaining whether they can be grown in this country on a commercial basis, and to possible schemes for advances from the Development Fund for that purpose. They have appointed two gentlemen of scientific training to investigate by inquiry at home and abroad, and to systematise for their use the information available in regard to the first three of these crops. In regard to beet, they propose to consider in consultation with the Government Departments concerned the question whether it is possible to make an experiment on a fairly large scale, designed to show not whether beet of good quality can be grown in this country (a point which they think may be regarded as settled), but whether it can be grown at a profit.

The fact has to be faced that such experiments are not very cheap, and that they may fail. But even in that case, the Commissioners venture to suggest that, though lost, the money spent will not have been wasted. It may be regarded as the price paid for the knowledge that under existing conditions a certain crop is not commercially possible in this country, and its loss may prevent for the future the useless expenditure of money and effort on a far larger scale.

Policy in Regard to Forestry.—On the subject of forestry development the Commissioners have formulated for their guidance in considering British schemes and applications, the following principles :—

(a) That the first requirement for such development is effective education in forestry at suitable centres, regulated by organised research and demonstration.

(b) That no scheme of State afforestation on a large scale can be considered until investigation has shown where State forests might be economically and remuneratively provided (regard being had to the interests of other rural industries), and until a trained body of foresters has become available.

(c) That for the present applications for grants for the

above purposes should include provision for the creation and maintenance of such staff as may be necessary to give practical advice and assistance to those who desire to undertake afforestation or to develop existing afforested areas.

It will be gathered that in considering their action in this, as in other directions, the Commissioners have been faced at the outset with the difficulty that the number of trained men in this country capable of directing forestry operations on any large scale is at present very small. Before all else they think it necessary that this difficulty should be overcome.

Agricultural Research and Education in England and Wales.—The Report then proceeds to describe the negotiations which were carried on during the year with a view to the settlement of a general scheme to be administered by the Board of Agriculture and Fisheries for the organisation of a system to aid and develop agriculture by the provision of technical advice for farmers and by promoting scientific research and experiments in the science, methods, and practice of agriculture. A final conclusion was not reached by the end of the year, but the Commissioners informed the Board that they were willing to contemplate an expenditure of £40,000 per annum for research work alone, apart from advisory and other work.

The Board of Agriculture and Fisheries, however, suggested to the Commissioners that certain interim grants should be made through the Board to certain institutions, to enable them to carry on approved lines of investigation during the year 1911-12, at the end of which period it was anticipated that the requirements of agricultural research would be dealt with under the general scheme. The Commissioners stipulated that the institutions concerned should be made clearly to understand that the grants were provisional and without prejudice to the general scheme under consideration, and that they would not be renewed in subsequent years, except in so far as the institutions were found eligible for grants under the general scheme.

The Commissioners then decided to recommend that the following grants, or such proportion as might be required for the financial year, should be paid to the Board for the benefit of the institutions named below, and for the purposes indicated.

	£
Cambridge University.—Research work	4,000
Bristol University.—(1) Bio-chemical investigations on cheese; (2) investigation of teart land	500
Yorkshire Council for Agricultural Education (Leeds University).—Investigation of atmospheric impurities	210
University College, Reading.—General work on (1) Microflora of cheese; (2) cereal selection	250
South-Eastern Agricultural College, Wye.—(1) Investigations on tobacco; (2) Mycological Department; (3) Entomological Department; (4) Investigations on hop resins	350
University College of Wales, Aberystwyth.—Botanical survey of Aberystwyth, and subsidiary inquiries ...	156
Harper Adams Agricultural College.—Research on wart disease, and finger and toe	190
Royal Veterinary College.—Investigations in respect of animal diseases	1,390
The Incorporated Society for Extending the Rothamsted Experiments	2,000
The British Dairy Institute, Reading	60
Woburn Experimental Station	600

The Commissioners further intimated to the Board that they would be prepared to recommend additional interim grants not exceeding in the aggregate a sum of £3,000 to certain other institutions which had not been reported on up to that time. They also informed the Board that they would be ready to recommend a grant of £1,000 to make provision for scholarships during the financial year so soon as a scheme could be prepared.

With regard to agricultural instruction (so far as it lies within the province of the Board of Education), the Commissioners, after negotiations, stated on the 2nd March that they were prepared to recommend the Treasury to allocate £65,000 per annum for agricultural education in England and Wales, on the submission and approval of a scheme for the expenditure of that sum through the Board of Education and Local Education Authorities.*

The Report also deals with the applications made by the Scotch Education Department and the Irish Department of Agriculture.

Co-operation.—On the 3rd September, 1910, an application was made by the Board of Agriculture and Fisheries for an advance of £20,000 per annum for the organisation of

* A circular letter setting out the details of this scheme appears on p. 425.

co-operation among agriculturists in England and Wales, and the Commissioners also had before them an application from the Agricultural Organisation Society, and took evidence in connection with both applications. An interim grant to the Society was contemplated at the close of the year.

Horse and Live Stock Breeding.—The Commissioners received on the 26th July, 1910, an application by the Board of Agriculture and Fisheries for a grant of £50,000 per annum, of which £5,000 was to be devoted to live-stock other than horses, and £45,000 to the encouragement of light-horse breeding in Great Britain, and after taking evidence the Commissioners recommended the Treasury to advance £36,000 for one year to the Board by way of grant, to be expended generally as follows:—

	£
(a) Payment of premiums to the owners of stallions ...	13,000
(b) Encouragement of the keeping of brood mares ...	10,000
(c) Free nominations for the service of mares by premium stallions	3,000
(d) Purchase of stallions	5,000
(e) Registration of stallions	5,000

In order to secure the elasticity which they considered necessary to the inauguration of a new scheme, the Commissioners reported that in their opinion the Board should be allowed some latitude in making transfers from one head of expenditure to the other, and in altering the character of their operations in detail.

The Commissioners suggested further that in the event of the Treasury favourably considering their recommendation, it should be intimated to the Board that the Treasury and the Commissioners will be prepared, if the result of the first year's working seems to justify a continuance of the experiment, and the state of the Development Fund permits of further advances, to consider favourably an application for a second grant at or near the end of a year from the date when the first advance was made—assuming that by that time it had been almost or quite exhausted.

The Commissioners recommended also as a condition of the advance that a majority of the members of each of the local committees formed under the scheme should be nominated by the County Council or Councils concerned.

The details of the scheme for the promotion of live-stock breeding had not been submitted to the Commissioners at the end of the year.

A grant of £10,000 per annum for five years was recommended for the extension of the existing horse-breeding schemes of the Irish Department of Agriculture.

Forestry.—The Commissioners received on the 25th March, 1911, through the Treasury, a memorandum from the Board of Agriculture and Fisheries, outlining a comprehensive scheme of forestry for England and Wales. The immediate advance desired is £9,300 for the year 1911-12, but the ultimate expenditure contemplated is very much larger. The Commissioners are communicating with the Board on the subject.

Schemes for the promotion of forestry in Scotland and Ireland were also under consideration, and in regard to Scotland, the Commissioners have agreed to the provision of a central demonstration area—for the acquisition of which preliminary steps are being taken—and of a forestry school in connection with it; and also to the provision of small forest gardens for the local use of the agricultural colleges.

In regard to Ireland, they have agreed to advances of £25,000 or £30,000 for the purchase of land, and to further advances, as soon as formal and definite applications are made under the Act, for additions to staff and for the maintenance and management of small woodlands in the hands of County Councils.

Other Applications.—The Commissioners also had before them applications for the development and improvement of fisheries, the construction and improvement of harbours and of inland navigations, as well as some miscellaneous applications.

Summary.—The sums of which the Commissioners have either recommended the allocation, or agreed to recommend it as soon as satisfactory schemes are framed, amount roughly to £165,000 per annum, and £100,000 non-recurring advances. By far the larger proportion of this expenditure, if ultimately approved by the Treasury, will go in agricultural research and instruction, viz., England and Wales £105,000 per annum, Scotland a lump sum of £60,000 and £5,000 per annum, Ireland £9,000 per annum.

These figures do not take account of the considerable sums, of which no definite estimate can yet be given but for which schemes were either being prepared or were under examination by the Commissioners at the close of the year, *e.g.*, forestry in England and Wales, the purchase of a demonstration area in Scotland and the establishment there of a central school of forestry, the development of Irish fisheries and fishery harbours, and the encouragement of the organisation of co-operation throughout the United Kingdom. Nor do they take account of applications which had not reached the Commissioners, though known as having been made or about to be made to the Treasury—as, for instance, schemes for the development and improvement of British fisheries and of Scotch harbours; nor again of possible expenditure on such projects as the revival of the flax and hemp industries, the encouragement of tobacco and beet cultivation, or the establishment of an institution for the study of rural economics.

In the first nine months of their work the Commissioners, so far as they are concerned, have allocated, and, as they think, rightly allocated, one-third of the annual income guaranteed to the Development Fund for five years. Out of the two-thirds which now remain they hope to provide during the coming year for considerable annual expenditure on such purposes as forestry and forestry instruction and the organisation of co-operation; and it cannot be supposed that expenditure on the purposes with which they have already dealt ought to or will remain stationary at the amounts provisionally fixed. Looking to these facts, the Commissioners state that they cannot but feel some apprehension that unless Parliament comes to the aid of the Fund its position in a very few years will not be a strong one. They will, however, be far more able to form an opinion on this important question at the end of the financial year 1911-12, by which time they hope that all the applications hitherto made to the Treasury will have reached them from the Government Departments, that considerable schemes known to be in preparation will have been submitted, and that the inquiries which they are making into such subjects as flax, hemp, and tobacco cultivation will have been completed, or be on the point of completion.

TOBACCO GROWING FOR INSECTICIDAL PURPOSES.

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NICOTINE, the active principle of tobacco, has long been known amongst fruit-growers as a very efficient insecticide. It is, in fact, one of the most effective general insecticides we have. Its effects are more lasting than those of any other wash, especially if a small amount of soft soap is mixed with it, and it does no harm to the foliage or to delicate blossoms. Its penetrating power enables it to reach the inner surface of curled up leaves, and when desired it can be mixed with a sulphur wash for a combined attack on aphis, caterpillars, and mildews.

The price at which nicotine is sold on the market, however, makes it too expensive for use for ordinary commercial purposes. With nicotine (96 per cent. pure) at 15s. per lb., and using 1 1-5 oz. nicotine in 10 gallons of water, the cost of the wash works out at nearly 1½d. per gallon. Professor Theobald considers 1 oz. nicotine per 10 gallons water quite sufficient if a small quantity (5 oz.) of soft soap is added. This reduces the cost to about 1d. per gallon, but even this price is much too high for general purposes.

To test the possibility of growing the tobacco merely for insecticidal purposes experiments have been carried out during the past year at the South Eastern Agricultural College.

In this connection the Excise Regulations respecting the growing of smoking tobacco in this country are of primary importance, but it must be remembered that for nicotine extraction the variety grown would probably be a snuff variety, unsuitable for smoking on account of its pungent character, and rendered still more so by the special treatment it would receive to increase its nicotine content. The fruit-grower, moreover, when growing his own insecticide, would not cure the leaves at all, so that the tobacco would never be in a fit state for smoking, and lastly, to eliminate all possibility of the home-grown tobacco being used for illicit

purposes, there seems to be no objection to de-naturing the crop by spraying the plants before or after they are cut with some objectionable substance so as to render them incapable of being smoked. At present, however, tobacco can only be grown in England by persons possessing an Excise licence on land approved by the Excise Commissioners, and in accordance with the prescribed Regulations, a summary of which was given in this JOURNAL, February, 1911, p. 943.

The fruit-grower would reap many advantages by growing his own crop rather than by buying the manufactured leaf. He would save the duty; he would save the cost of curing and fermenting (operations in which a large amount of nicotine is lost), and he would save the cost of carriage and middlemen's profits. An exceptionally rank variety of tobacco containing the highest percentage of nicotine would be selected, and as large a crop as possible would be grown without regard to the question of quality from the smoking point of view. All these circumstances would tend to reduce the cost, and he would get a much cheaper article and an article much better suited to his purpose than any he could purchase.

Nor is it the fruit-grower only who would reap the advantage of growing his own tobacco. The hop-grower and also the sheep-farmer would gain quite as much. The worst insect enemy which the hop-grower has to fight against is undoubtedly the Hop Damson Aphis, or "Hop Fly" (*Phorodon humuli*), and against this pest nicotine wash is considerably more effective than the commonly used soft soap and quassia. Then, again, nicotine is very effective as a sheep-dip. It destroys both the sheep ked (*Melophagus ovinus*), and the sheep-scab mite, without injuring either the sheep or the wool. In fact, it was by compulsory dipping with either a tobacco and sulphur dip or a lime and sulphur dip that sheep-scab was exterminated from New Zealand. The fruit-farmer, the hop-grower, and the sheep-breeder and feeder would therefore all gain if the price of nicotine could be so reduced as to be within the reach of everybody.

The experiments which were conducted at Wye last year dealt chiefly with questions of cultivation, and they demonstrated that tobacco can be grown to maturity in this country.

and that with a suitable variety and a good soil a satisfactory crop could be obtained. When the leaves are dried it is possible to extract about 95 per cent. of the nicotine simply by soaking the powdered leaves in water. Investigations are, moreover, being carried out in the Chemical Laboratory of the College by Mr. Edwardes-Ker with a view of discovering a simple and inexpensive method by which the grower can extract the whole of the nicotine. No statement can at present be made on this point, but in the meantime an account of the method of cultivation, based on the experiments at Wye last year, may be of interest.

Varieties Grown.—There are two species of tobacco commonly grown for smoking purposes, *Nicotiana Tabacum* and *Nicotiana rustica*, both belonging to the same natural order as the potato and the tomato—the natural order *Solanaceæ*. *Nicotiana Tabacum* is the commonest, and is easily distinguished by its red tubular flowers and long and moderately narrow leaves. It is the species that provides all the best types of smoking tobaccos. The other species, *Nicotiana rustica*, has a yellow flower of quite a different shape from that of *N. Tabacum*. It is a much shorter plant, and bears large wide leathery leaves rather resembling cabbage leaves. It is a much coarser plant altogether than *N. Tabacum*, and as coarseness as a rule means high nicotine content it is probable that this species will be more likely to suit the purpose of the nicotine grower than the one ordinarily grown for smoking tobacco. Moreover, it has other advantages in that it is hardier and matures earlier than *N. Tabacum*, and consequently it is more suited to our short English summer.

Of these two species twenty varieties were tested, the seed being obtained from the United States, the Transvaal, India, Italy, and Ireland.

Sowing the Seed.—Owing to the short summer tobacco cannot be grown entirely out of doors in this country, and the seed has to be started under glass. An ordinary garden frame consisting of three “lights,” each measuring 6 feet by 4 feet, and resting on a hot-bed, was found a suitable form of seed-bed. The hot-bed should consist of fresh horse manure containing a fair amount of straw, and the manure should not

be allowed to heat until just before the beds are made. It should be about nine inches to a foot deep, or at the rate of about one ton of manure per 6 feet by 4 feet sash. The glass-covered frame should then be placed on the top of the manure without any delay, and the heap covered with about two inches of finely prepared soil in which to sow the tobacco seed.

Tobacco seed is extremely small and consequently very difficult to sow thinly and evenly. The best way is to mix the seed with a large quantity of ashes so as to increase the bulk. It can then be sown more thickly, and there is the additional advantage that the colour of the ashes shows up against the soil, so that the sower can see when any part of the seed bed is left unsown.

The quantity of seed sown was one-thirtieth of an ounce to each sash, but this was found to be too much, and one-fortieth of an ounce of seed would be quite sufficient. The sowing was done on March 23rd.

Planting Out, Soil and Manuring.—The young plants may be put out in the open as soon as all danger of frost is over, about the end of May. The most suitable soil for the production of nicotine, so far as the experiments have shown at present, is a moderately heavy rich loam with liberal manuring. A good foundation in the form of dung in the autumn will be required, followed by a good dressing of artificials in the spring before planting out. Nitrogenous manures especially seem to encourage the formation of nicotine, so that two or three small dressings of nitrate of soda after the plants have become established will be found useful.

The soil must be thoroughly well worked and reduced to a fine tilth before planting out. The rows should then be marked out with an empty drill 3 feet or $2\frac{1}{2}$ feet apart, and the plants dibbled in after the manner of cabbages at distances of 2 feet or $1\frac{1}{2}$ feet in the rows. Foreign experiments have shown that the closer the plants are put together the higher becomes the yield but the lower the percentage of nicotine. The experiments last year failed to show any difference in nicotine content, whilst the close-planted plot (3 feet by $1\frac{1}{2}$ feet) gave the heaviest crop.

Shelter.—The question of shelter is a very important one. Only land which is naturally well sheltered from wind should be selected for the growing of tobacco. A single stormy night may do an immense amount of damage to the crop unless it is well protected. Where natural wind breaks cannot be obtained, artificial ones, such as hop lewing or a belt of some tall luxuriant plants, *e.g.*, Kentucky hemp, artichokes, climbing haricot beans, or Ne Plus Ultra peas, must be used.

Weeding.—The land must be kept scrupulously clean in the early stages of growth, because by the middle of July the leaves of the plants will begin to overlap, making horse-hoeing impossible, whilst even hand-hoeing will have to be abandoned about a month later. All weeds must therefore be removed while the plants are still young.

Topping.—When the plants have developed about a dozen good leaves the whole top of the plant must be removed. This operation is known as “topping,” and has for its object the prevention of seeding and the concentration of the entire energy of the plant into developing to the full those ten or twelve leaves that remain. Topping is nearly always carried out with smoking tobaccos, and it is found to be even more necessary where nicotine is the object in view. A few large well-grown leaves were found at Wye to contain $2\frac{1}{2}$ times as much nicotine as a larger weight of small leaves left on another plant growing under the same conditions but left untopped.

The effect of breaking off the stem of the plant is to cause development of shoots in the axils of the remaining leaves. These are known as “suckers,” and they have to be removed by hand as fast as they appear. In the case of smoking tobaccos suckering is done once a week from the time of topping to the time of harvesting, and probably it pays to do it just as often in the case of tobacco grown for nicotine extraction. The work can quite well be done by a boy, but it is nevertheless an expensive operation, costing about five shillings an acre every time it is done.

Harvesting.—By the beginning of September the plants should be ready for harvesting. It is very important not to cut too early as the nicotine content increases very rapidly

during the last week or two of growth. The ripening of the leaves can be told by a distinct change in colour from a dark to a lighter shade of green, but the exact time at which it is best to cut is still undecided. The nicotine content of some plants tested last summer increased by 1.5 per cent. during the last ten days they were on the ground, so that it would be better to cut the leaves when they are over ripe rather than harvest them too early.

There are two common methods of harvesting tobacco—the Single Leaf method and the Whole Plant method. The former method consists in picking the leaves off singly as they become ripe and threading them on strings to dry. The Whole Plant method consists in cutting the whole plant when the middle leaves are ready, and hanging it up bodily by the stem to dry without removing the leaves at all. The second method is considerably the cheaper one, and so was the one adopted at Wye last summer, the whole plant being cut down level with the ground. The best instrument for the purpose is a long-handled pair of pruning shears, but an ordinary wood chopper will do the work quite well.

Drying.—The plants should not be cut while dew is on the leaves, as they are then very brittle and a number will fall off. It is a good plan to leave them on the ground to wilt for a few hours after cutting, the leaves gradually becoming limp and then clinging better to the stem. The base of each stem is then attached by means of a piece of string to a pole, and a row of plants hung up to dry, either naturally in a barn or with the help of a stove. Self-binder string recovered from the threshing machine after being used the preceding summer for binding sheaves of corn, was found to be just the right length and texture for tying the plants to the poles.

Stripping.—As soon as the leaves are dry they may be stripped off the stems and stored away in a heap till the time comes when they are required for spraying. As stated above the best method of extraction is still being investigated, but soaking the cut-up leaves in water is quite effective in extracting the greater portion of the nicotine. It is certainly a simple way, and may be found to be the cheapest method, even though by the aid of chemicals a larger proportion of the nicotine may be extracted.

Cost per Acre.—The cost of growing an acre of tobacco as described above was estimated at £21 12s. 6d., but there are several ways in which the cost may be reduced. Harvesting and stripping the leaves alone cost over £5, and it is intended this year to try the effect of picking the leaves off the standing plants as they become ripe in the field, throwing them into a cart, and drying them with artificial heat on a hop oast. It was originally thought that a high temperature would cause a loss of some of the nicotine, and that air-drying the tobacco would be the most effective method, but it was found that there was no loss so long as the temperature did not exceed 130° F. Kiln drying is therefore being tried this year. The stalks of the plants contain a certain amount of nicotine as well as the leaves, but whether the small quantity contained in them is sufficient to justify the expense of harvesting, drying, and extracting is another question remaining to be investigated. It may perhaps be found possible to extract the nicotine without drying the stems.

Last season's results showed that an average yield may be expected of from 1,600 to 2,000 lb. dry tobacco leaves, excluding the stalks. Allowing 4 per cent. of nicotine, this works out at 64 lb. to 80 lb. nicotine per acre, or a cost of approximately 6s. per lb.

These figures, which do not include the cost of putting up wind-breaks or the cost of extraction, must be taken with some reserve. In the first place, it remains to be proved that it is possible to get all this nicotine out of the tobacco, and in the second place these figures are based on only one year's experiments, and it may be that a variety grown on a small plot will not average so well when grown on a large scale. The weather, however, last year was unusually cold, and with more sun and a higher temperature a higher percentage of nicotine might be expected.

Another point which must be borne in mind is the difficulty arising from growing the crop under Excise supervision. The restrictions imposed, even if they do not involve actual expense, are undoubtedly troublesome to a small grower.

FORESTRY IN NORWAY.

S. BURTT MEYER.

THE natural inaccessibility of her interior and the sparseness of her population have handicapped Norway in commercial competition, but, locked up in a thousand valleys, lies her capital, the forests of spruce and pine. Time was when the great trees fringed her coasts and spread to the snow-line of her mountains, but now wide tracts have been cleared, and almost every hillside bears the mark of the woodman's axe.

The first mention of trade in timber comes from the 12th century, while a century later an export trade with Holland was flourishing. Up to about the year 1500, when the first saw-mill was established, all timber was split into the required dimensions, but with the new machinery came a marked increase in trade. After the Great Fire of 1666 London imported large quantities of Norwegian timber, although, two centuries earlier, Henry the Third is recorded to have purchased from Norway a ship-load of pine-panelling for the renovation of Windsor Castle.

With the growing demand, however, came a reckless indifference to the future; the grasping merchants of the Hanseatic League, who dominated Norwegian commerce for two centuries, burnt what they could not sell, baring the once green coastline; with the introduction of the steam-saw great havoc was wrought on the more accessible woods of the interior, and, crowning all, the modern demand for paper pulp has led to an alarming diminution in the supply. The drain of five centuries has not, however, impoverished the land beyond recovery, as some authorities would have us believe. There are still great tracts of fine timber land; there are even larger areas that, with scientific care, are gradually re-assuming their proper density of trees.

In attempting to describe the progress of scientific forestry in Norway it will be enough to sketch the growth and work of the Government Service, together with instances of private enterprise that call for attention.

The writer recently spent a year studying the forest life of Norway, and through the kindness of Herr Jelstrup, of the Bureau of Forestry, and Woods Managers Kiær and

Större of the Forest Service, saw examples of the work that is being carried on in widely separated districts.

The forest areas of Norway and the United Kingdom compare as follows :—*

	Norway.	United Kingdom.
Area under Forests	26,945 sq. miles	4,800 sq. miles
Percentage of Total Area	21·4 per cent.	3·9 per cent.

Of the total area of Norwegian forests about 17 million acres are productive, and of these the State owns 2 million acres and has partial control over 440,000 acres.

The annual output of timber from Norway can be shown to have increased annually for as many years as figures are available. In 1906 the production of unmanufactured timber was worth 2½ millions sterling, while manufactured timber and wood-pulp contributed 2 million pounds. The total for all classes showed an increase of over one million pounds on the figure for 1901; the rise being equally distributed between manufactured and unmanufactured timber.

Conditions of Forestry.—Of the forest trees of Norway the Scots Pine (*P. sylvestris*) is the most abundant. Next, perhaps, comes the Birch, and lastly the Spruce (*P. excelsa*). The Oak, Ash, Elm, and Beech are found in favoured places, while the Alder, Aspen, and Rowan are distributed pretty generally.† The two commercial timbers of the country are undoubtedly the Scots Pine and the Spruce, the latter having attained greater importance since the introduction of the paper pulp trade.‡ It is fortunate, therefore, that the natural habitat of the Spruce is at a lower altitude than the Pine, and, generally speaking, at a more southern latitude.

The Rev. T. B. Willson says: "The elevation has, of course, much to do with the growth of the trees; the snow-line in Norway being at about 4,000 feet, and getting lower the further north you go. In the country south of Trondhjem the Pine, as a rule, ceases at about 2,600 feet above the sea-level, where it is replaced by the Birch, which will grow up to about 3,500 feet; above that elevation only dwarf Birch and Willow will be found."

* According to Dr. Max Endre's *Handbuch der Forst Politik* and the Norwegian State Statistics. The *Bulletin of the International Institute of Agriculture* quotes: Norway, 26,723 sq. miles; United Kingdom, 4,850 sq. miles.

† Of the State woods, 69 per cent. are evergreen, 31 per cent. deciduous.

‡ In the manufacture of wood pulp or cellulose, Spruce is the staple timber used. About 15 per cent. of Pine can be added without causing deterioration in colour.

The finest forest land, chosen with regard to general accessibility and condition of growth, is probably that lying in the neighbourhood of the capital and extending north and north-east over the Glommen watershed.* The forests comprised in these areas are largely owned privately, and are the field of operation of some of the largest lumber companies in the country.

Forest Management.—Until quite recently the science of Forestry was but imperfectly understood by anyone but State officials; the great natural reproductive powers of the woods being entirely relied on to re-sow the land after felling. There is no doubt that this treatment has given remarkable results, provided that the thinnings have not been too heavy, but in many places, where the soil is poor and exposed, the stock is slow in re-asserting itself. The German method of clear cutting can hardly be said to exist in Norway.† The three systems in use at the present time are those known as Group, "Mother Tree," and Selection. The first, which consists of gradually clearing a circle until its diameter equals the height of the surrounding trees, works admirably; the second is used, where sufficient seed trees can be found, on the same principle as the Group, while the third lends itself particularly to the management of small and irregular woodlands.

Forest Operations.—The work of felling and removing the timber commences in the autumn and continues throughout the winter, being greatly facilitated by the snow which covers the ground from November until March or April. The checking and floating takes place when the thaw fills the rivers, and during the summer the timber is marked that is to be felled the following winter. It will be seen that forest operations differ seasonally in Norway and England. For example—at the time when transit is easiest in Norway, English forest roads are at their worst. The planting season, also, is restricted in Norway on account of the heavy annual snowfall.

Labour.—The necessary labour of the forests is recruited very largely from the class of small peasant proprietors

* The district referred to includes the amts or provinces of Akershus Hede-marken, Kristian and Buskerud. Church and State own 700 sq. miles, or about 1/20th of the total productive woodland in these provinces.

† Coast Erosion Commission, 2nd Report: Miller 23480—"There is no such thing as cutting down in Scandinavia on a large scale."

that is such a feature of the country.* These men live within easy reach of the woods, and, being bred to their work, are very reliable.

The wages paid are high compared to ordinary agricultural wages. A woodcutter now earns 2s. 10 $\frac{1}{4}$ d. a day, compared with 2s. 0 $\frac{1}{2}$ d. in 1880; while a driver with a horse can earn half as much again. In the sawmills 2s. 11 $\frac{3}{4}$ d., and in the timber yards 3s. 1d., are average daily wages.

State Forests.—As is the case in many other European countries, the Norwegian Crown Lands represent now only a part of what they have been. The best forests long ago passed into the hands of private individuals either at times of financial need or under the lax supervision with which they were formerly administered.

The institution of so-called rights of cutting and grazing has, in some parts, been allowed to grow to such an extent that at least 10 per cent. of the State forests yield no income, while from other large tracts only a trifling income is obtained. "Rights" are largely held by the peasant proprietors whose land adjoins the forests and include: limited right to fell "dry" or damaged timber and firewood; right to gather herbage, bedding material, cones, etc., and to graze animals, sometimes including goats (an extremely harmful privilege).

Another important point is the latitude and altitude. Over 57 per cent. of the State forests lie north of latitude 65°, and are, therefore, slow in yield. In the south a great proportion are at high altitudes and are much scattered. As an example of this, the Church woods, over which the State Department has control, have a total area of 163,000 acres and are split into 326 separate forests, each containing, on an average, 500 acres.†

Government Forest Service.—The first preparation towards setting in order the woods management of the country was made in 1737, but the present organisation dates from 1857, when a Bureau of Forestry with a Director at its head was

* Coast Erosion Commission, 2nd Report: Miller 23372—"Practically all the labour we get for the forests of Norway . . . is from small farms—small holdings."

† The Church woods are mostly in excellent condition and are not found difficult to manage. Witnesses before the British Royal Commission declared the management of similar areas difficult and costly.

established by Parliament. From that date up to the present time the Service has increased from a staff of two to upwards of five hundred men. The present staff ranges from the Chief of Bureau to the Divisional Guards (usually local landowners, paid a small annual fee for their services). The scale of pay is low, but it must be remembered that living is cheap in the country districts and that travelling expenses and about 5s. a day extra are allowed to all officers while on tour.

The Bureau is entrusted with the general management of the State woods and afforestation areas, including matters of law, finance, and valuation. Among other matters, it deals with the conservation of woodlands, and has power to deal with concessions granted to foreigners and companies. With the earliest mention of the timber trade in Norway we have records of timber export duties and the like, but little attempt was made to prevent over-cutting. During the fifty years of its existence, the present Department has done valuable work defining the boundaries and peasant rights in the Government forests. The first measure of conservation was passed in 1892, forbidding any exportation of timber from the provinces in the extreme north for a period of three years. By a Law of 1893, since amended, the supervision of private forests was entrusted to the local Councils.

The damage done to woods by fire in former times was very extensive; the area destroyed during the last century being estimated at over 70 square miles. Effective legislation, which dates from 1893, has been greatly aided by the extension of road, rail, and telephone, by which means assistance is now quickly procured.

The financial position of the State Woods for the last fifty years may be briefly shown as follows:—

Profit on State Woods	...	...	...	£593,389
Value of Peasant Rights	...	...	...	381,944
Rise in Value—				
(a) Of Original Woods	...	£361,708		
(b) Of Purchased „	...	79,246		
			£440,954	
	Total	...	£1,410,287	
Less Cost of Improvement Schemes	...	...	21,073	
Net Profit in Fifty Years	...	...	<u>£1,394,614</u>	

Afforestation.—The activity of the State as well as of private individuals as regards this question is largely due to the efforts of two societies—the Royal Society for the Welfare of Norway and the Norwegian Forestry Society. The latter receives an annual grant from the State and has branches all over the kingdom.

Although the actual work of afforestation has received most attention in the coast-line provinces, yet preparatory schemes of drainage and land-improvement are common in the interior, and planting has been widely carried on over the high-lying Crown lands of Eastern Norway. In connection with this it is interesting to note that the writer visited a large area on the Swedish frontier, covered with young *Pinus montana* at a height of 2,000 feet above sea-level. At 1,800 feet, seed of *P. sylvestris* sown the year before was germinating well, while at from 1,500 to 1,800 feet were many plantations of young pine and larch, all doing splendidly.*

At some places on the coast large sums have been spent in dealing with shifting sands. The process usually adopted is the same as that practised on the northern shores of Jylland in Denmark. Irregularities in the surface are first filled in; the ground is then covered with moss, heather, or any kind of loose material, pegged down in places; seed of *Elymus* or *Arundo arenaria* is sown, and, lastly, broad strips are planted with *Pinus maritima*.

The season for planting is restricted by the snowfall to early summer or early autumn. Sowing is found to be more successful in the interior than on the coastline, where the young seedlings are bared of snow while the weather is still cold.

The cost of planting may be reckoned at 22s. per acre, and the method used is generally either by holing with German planting irons or by planting in small mounds of good soil or turves distributed over the ground.

The task of determining the best varieties of trees for planting has been taken up by many private forest owners, as well

* Royal Commission Report: Mr. Forbes fixes the maximum planting altitude at 1,200 feet on the Pennine Chain; Sir H. Maxwell, at 1,000 feet in Scotland.

Quarterly Review, Jan., 1911: Mr. J. C. Medd writes—"In England over three million of the twelve million acres are 1,500 feet above sea level, and are herefore unsuitable for planting."



BUCKING TIMBER ON THE GOVERNMENT FOREST RESERVE AT LAKE FOIMUND, I.A., 1921.



SCHOOL CHILDREN PREPARING LAND FOR PLANTING.



as by the Schools. One of the best examples of this is near Hamar, where Herr Kiær of the Forest Service is devoting 1,500 acres to experimental work and the training of students.

Planting by the State.—Although for many years the buying of land by the State for planting purposes had been advocated, it was not until 1873 that the experiment was made with 20 acres of glacial land, costing 18s. per acre. The area was gradually increased, until 2,500 acres had been obtained, at a total cost of £4,600.

The rise in price may be noticed from the fact that while in 1886 18s. per acre was paid for 150 acres, ten years later 275 acres of similar land cost over 30s. per acre.

Up to 1906 a total of 8,000 acres, lying mostly on the West Coast, had been purchased for planting purposes at a cost of £8,690. Included in this amount is the cost of 25 acres of nursery land, at £60 per acre. The price for planting land averages 18s. per acre. The estimated value of the whole area now is £13,240, showing an increase of £4,550. One area of 1,575 acres was purchased in 1904 for £1,110 (or 14s. per acre), and planted. It was valued in 1907 at £1,950, showing an increase in three years of £840 on the initial cost of the land.

Plant Nurseries.—In 1857 the State made their first grant toward the encouragement of tree planting. Seed was bought and sown, but the experiment hung fire, and not until five years later was any extensive sowing tried, under the direction of a nurseryman who had seen the work carried on in Jylland. Later, about 65,000 seedlings, both conifers and deciduous trees, were imported from Denmark and temporary nurseries were established. The deciduous trees did well under the new conditions, but the conifers suffered in transport.

About the same time, the State made another grant toward a planting scheme for the West Coast and the establishment of nurseries in convenient places. In connection with this, officers visited Denmark, North Germany, and Holland, and were so favourably impressed that the work was continued on an extensive scale, a nursery being established at Stavanger. The growth of the latter is shown by the fact

that, whereas the annual output at the beginning was 200,000 plants, in 1906 the number had increased to over two million plants. From each of the nine large nurseries now under State control, an average of 700,000 plants are sent out annually. Of these only a small percentage are deciduous.

Seed Stations.—The importance of procuring good seed was early recognised, and, although the first supplies were of necessity imported from Germany, it was found, particularly with regard to *P. sylvestris*, that home-grown coniferous seed was preferable. Consequently, a collecting station was erected at Vossevangen, at a cost of £175. Cones were bought from a variety of places along the coast, and a ready sale of guaranteed seed was found, extending even to foreign countries. The chief difficulty, however, lay in the unsteadiness of trade, due to the variability of seed years, and the consequent changing nature of the staff required.

The need for such work may be gauged by the fact that there are now four similar stations in working order, the finest being that at Hamar, which cost £300 to build and equip, and which, with a capacity for dealing with a thousand bushels of cones, has an annual output of over one ton of seed.

Planting by Communes and Societies.—The largest communal scheme in Norway is that at Trondhjem, where 4,500 acres of common land are being planted up. Grants have been made from the rates, and from the local Spirit Tax, and in 1896, 1,500 acres had been planted with 1,600,000 trees. The scheme has proved very educative in that many foreign, as well as indigenous, species have been used in the work.

The Bergen Afforestation Society has, since 1870, had a successful arrangement with several large landowners, whereby the Society undertakes planting, if the owner agrees to place future control in the hands of the Society, or, failing them, the State. The owner bears the cost of upkeep, fencing, etc., but receives all the profits.

Up to 1907 over a million young Spruce and Pine had been planted, and that the scheme has been successful is shown by the following results:—

On $\frac{1}{4}$ acre, at 25 years, there were 300 trees of 7 inch breast-high diameter, with a height of 24 to 36 feet. On another

$\frac{1}{4}$ acre, two years younger, there were 400 trees caliperling 5 in. and from 24 to 30 feet high.

The work, in nearly all cases, has been under the supervision of the Government Service.

School Planting.—Before leaving the subject of planting, it is interesting to note the excellent work that is being carried on among schools in the country districts by the institution of planting-days and elementary instruction in the theory and practice of afforestation.

The Norwegian Forestry Society, who have, since 1890, received an extra grant toward this object, have made arrangements whereby the State provides the plants and gives the necessary training to schoolmasters who wish to interest the children in the movement. On one piece of parish land near the west coast, 100,000 plants have been put in by the school-children in three or four years, and are thriving well. The work is rapidly extending to country schools all over the land.

Forestry Education.—The first foresters received their training in Germany, particularly at the schools of Tharand, Aschaffenburg, and Giessen. Later, many took the course at the Forest Institute at Stockholm. By a Law of 1897, the Agricultural High School was founded at Aas, and a course in forestry was arranged. Students are entered for the course every other year, and the application for entrance has, from the beginning, far exceeded the accommodation. The rules stipulate that the applicant must be over 19 years old, with a certificate from one of the provincial schools showing efficiency in elementary forestry, and with a year's practical experience.

The High School course comprises one year's study of general scientific subjects and a second of specialised work. One year's additional practical work is arranged for students who intend entering the State Service. The subjects for the first year include: Rural Economy, Mathematics, Chemistry, Geology, Zoology, Botany, Physics, Book-keeping, and Theoretical Surveying. In the second year—Forest Management, Valuation and Law, Advanced Book-keeping, Practical Surveying, Levelling, and Map-making. For two months in the summer the second-year class live in the vicinity of

some large forest, where the practical work of Valuation and Surveying can be easily carried out. Early in the autumn the same class, accompanied by some of the Staff, make an extensive tour of the country, with the object of seeing all kinds and conditions of wood-land and woods-management. Half the cost of the tour is defrayed by the student.

An elementary Forest School was founded in 1876 at Kongsberg, with a forest officer at the head. Within the next ten years two other schools were started at Stenkjær and Elverum. The object of these schools was to offer a nine months' course in the theory and practice of forestry. It was intended to train annually twelve students, but the demand always exceeded the endowment.

The course at the schools was extended in 1905 to one year, in order that fuller instruction might be given in technical subjects. The number of students received annually was increased to 16, while the age limit was changed to 18-25 years. A plan was also completed whereby students, for eight months out of the twelve, were put under the direction of capable woodmen for their practical training. The number of men passed through the three schools since their beginning now exceeds 700.

Besides the above there are three County schools, partly supported by the State, while at nearly every Agricultural College instruction in forestry is included in the curriculum.

A SPANISH SYSTEM OF ESTATE MANAGEMENT.*

M. LE COMTE DE MONTORNÉS.

A PROBLEM of supreme interest in connection with agriculture to-day is without doubt the social agrarian problem which, at the present time, has become of vital importance in agriculture as well as in industry.

The establishment of perfect harmony between the landlord and the tenant is indeed one of the questions which ought to

* This Paper was read at the International Congress of Agriculture, Madrid, in May last.

be most carefully considered, and anything attempted in this direction is likely to be of utility with a view to the practical realisation of the great reforms needed in agricultural production and cultivation.

Numerous though the industrial population of the world may be, their number is small in comparison with the enormous population which lives exclusively by the cultivation of the soil. This long-suffering class is at least equally worthy of consideration and guidance in order to enable it to attain improvement and well-being.

Problems relating to agriculture are unquestionably of a very complex nature, and consequently difficult of successful solution, for in no other human science does theory differ so much from practice.

The steps which are being taken to encourage and maintain the system of small ownership, and to bring about the immediate or gradual conversion of the tenant into the owner, are certainly worthy of all consideration and praise; but, unfortunately, for several reasons, action in this direction cannot be taken everywhere, and, indeed, in many cases is not desirable. Moreover, in view of the slowness of the change, we must endeavour to find in existing conditions of ownership and rural labour means of immediately improving the position of the labourer, and of strengthening the ties which bind him to his landlord, and thus placing him in a position to abandon the routine unfortunately so common in the case of the mass of agricultural labourers of the whole world, so that, without the tenant leaving the soil which saw his birth, or the owner abandoning the fruit of the economy and labour of his ancestors, they may put into practice the splendid results of modern agricultural science, to the spread of which assemblies like our own contribute in such an important manner.

Far be it from me to pretend to offer a solution of this difficult question. It will be sufficient for me to present to you an account of an attempt which I have made, and which has happily given excellent results, in one of the most important districts from the point of view of agriculture in my own country.

The different systems generally in use for the cultivation

of the soil can be placed under three heads: (1) Direct cultivation by the owner himself by means of day-labourers paid a fixed wage or receiving a certain share of the profits. (2) Cultivation by the tenant, the latter paying over a part of the produce obtained; and (3) Cultivation by the tenant, the latter paying a fixed rent for the usufruct of the soil, whatever his system of cultivation may be.

My modest efforts have been directed towards a combination of these three systems, according to the nature of the land and the crops, by means of the direct intervention of the owner, facilitated and supported by this combination.

The first group is formed of fields where, by reason of a lack of rain, recourse has to be had to irrigation from rivers and springs, and of fields which the tenant devotes to the production of crops for his own use and that of his live stock, and for which he pays a fixed rent per acre. The second group comprises the larger areas under the regular crops, such as vines, olives, oranges, &c., the crops of which are gathered at regular periods. These, not being consumed by the farmer himself, are sold either immediately or after some preparation, and form the real source of profit. Finally the third group embraces the general work of the estate, and the work in connection with certain crops which are all paid for by the owner by means of fixed wages. The combination of these three systems on the same estate under certain special conditions has given very satisfactory results, combining the interests of the proprietor and the tenant, while allowing the former a continued and amicable intervention in the whole estate, an intervention which is well received by the tenant, and thus constituting a harmonious whole for the welfare and satisfaction of both.

On the estate referred to the tenant cultivates three or four acres of irrigated land, for which, together with his house, he has to pay a fixed annual rent. He also cultivates a larger area planted with vines, olives, and carobs (cereals are not cultivated in this part of Spain except on irrigated lands). The tenant occupies these lands on condition that he cultivates them according to certain fixed rules, to which he is obliged to conform absolutely, and also uses the ploughs and other implements furnished by the owner. The tenant must defray all expenses of cultivation and harvesting; the crops are

carried to the granaries of the owner, where they are carefully weighed in the presence of the tenant, who receives a receipt for his share, which is placed to his credit in the yearly settlement.

The tenants as well as the members of their families are employed at a fixed wage in periods in which there is little work, in improvements on the estate, in repairs to roads and buildings. This is arranged on a regular system, so that everyone has a share in this work. At the time of preparation of the produce, in this case the manufacture of wine and oil, there is enough work for all.

In the course of the year small sums are advanced to the tenants up to 30 per cent. of the average value of the share generally produced by the crops of the leased lands.

The tenant's profit is therefore made up as follows:—
(1) Of the produce of the land held at a fixed rate less the rent; (2) of his share of the produce of the land which he holds co-operatively with the owner; and (3) of the wages he earns during the year for work on the estate and in connection with the crops.

He has then to his credit, in the balance at the end of the agricultural year, the produce of the leased lands and the wages which are due to him; and to his debit, the rent of his irrigated land and house, the advances which have been made to him, the total value of manures received for the irrigated land, and a part of the expenses of the manures used on the other cultivated lands.

If the final balance is in his favour it is paid to him at once; in the contrary case he is allowed three terms, which coincide with the periods of sale of his small crops and kitchen garden produce, of his fattening animals and other live stock.

It will be noticed that the owner obtains all the produce of the land (except that for which fixed rent is paid), that is, all the produce which is naturally of the greatest value; half of this being obtained by right as his share and half by purchase; the purchase price is fixed by mutual agreement between a representative of the owner and a representative of the tenants, according to the prices prevailing in the district at the time.

In this way the tenant is assured of a fair price and a sure

payment. At the same time the system avoids the fraud to which the system of sharing the crops lends itself when the tenant gathers his share. It allows the owner to deal with the whole of the produce of his estate, conduces to uniformity and efficiency of methods, and enables employment to be given to the tenants for a considerable length of time. All these circumstances justify the direct and continuous intervention of the owner in the cultivation, because it is on the condition of the produce that the result of its final preparation, and consequently the profit of his business, must depend.

The system undoubtedly necessitates the continued intervention of the owner, but this intervention requires him either to pay periodical visits to his estate or to reside there permanently. Those high in the social scale thus set an example to those below them of the much desired return to the land which has been so splendidly advocated in the writings of M. Meline. It also fosters the union of the tenant and the owner, by creating a community in which the former gradually recognises the advantage of the advice and modifications suggested by the latter with regard to cultivation, and accepts them with pleasure, even though he may sometimes have to abandon ancient practices. Facts show him clearly that the benefits do not go solely to the owner, but are for his own profit as well.

Supplementary to this, the owners might take an interest also in the religious, moral and physical welfare of their tenants by the provision of religious instruction and schools, by forming societies for providing against illness, and by instructive and recreative meetings, as is done on the estate under consideration. In such cases, it will be observed with satisfaction how cordial are the relations between the two classes, and how the discord between them insensibly vanishes. This system may quite possibly not be applicable everywhere, but surely in its essence it can be carried out in numerous districts in many countries, and although to bring it to a successful conclusion the owner must make certain material sacrifices, without these sacrifices no ideal can be realised. The greatest ideal of the moment is certainly that of putting into practice the numerous improvements that have been effected in agriculture by stimulating the inertia of the

mass of agricultural labour, and thus contributing to the moral and material peace of so important a class.

I could enter into greater details in support of this system, which, although open to objection on many grounds, when considered from the economic point of view may, in spite of all its defects and difficulties, give better results than many others already in operation. Even though it may not attain to the social end which we have in view, and of which we all recognise the urgency, it will avoid, or at least modify, the dangerous tendencies which are to-day rapidly spreading among the rural population.

By way of conclusion to this humble essay I would present to the Section the following conclusions :—

In the present state of the social agrarian problem we must seek, in order to retain the owner and the tenant on the land, a system of management in which the owner shall be directly interested in the produce of his estate, but in such a way that he shall not abandon the immediate and constant supervision of his land.

In the majority of cases this may be attained by grouping three systems now chiefly in operation, viz. : (1) Direct cultivation by the owner ; (2) Cultivation by tenants in exchange for a share in the produce ; (3) Payment of a fixed rent for the usufruct of certain lands to which the foregoing method is not applicable.

These three systems in combination on the same estate will give excellent results, and will conduce to perfect harmony between the two parties interested. Especially will this be the case if by means of equitable arrangements all the produce susceptible of further preparation can be transferred to the owner or to persons capable of dealing with it properly, with the exception of those crops which it is more convenient to grow on lands at a fixed rent, owing to their being immediately used by the tenant.

In addition, if the owners concern themselves, as they are bound to do, both by their interest and by moral obligation, in the religious, physical and moral welfare of their tenants, we should reach a condition which would be in harmony with present social needs, and prevent either owners or tenants from leaving the land.

IN some of the outbreaks of this disease investigated the spores of *Nosema apis* have been found in enormous numbers in the cells lining parts of the alimentary canals of the affected bees. These cells become completely disorganised and eventually the spores escape from them and are voided in great numbers in the excrement. Such cases, which appear to be more frequently met with in the spring, are undoubtedly due to infection with this parasite.

**Isle of Wight
Bee Disease.**

In most of the outbreaks recently investigated few spores, if any, have been found, but parasites, which are probably young stages in the growth of *Nosema apis*, are usually present in the cells lining the intestinal tract.

It appears probable, therefore, that during the colder months, when the bees show little activity, the parasites grow and reach the spore stage before the bees succumb, while during the warmer months the rapid multiplication of the parasites often kills the bees before the spore stage is reached.

Experiments have proved that normal bees may be artificially so heavily infected that the intestinal cells are crowded with spores. Infection may be produced in various ways: (a) by feeding with spores, (b) by feeding with candy on which infected bees had fed, (c) by mixing naturally infected excrement with the food, (d) by confinement in a box in which infected bees had travelled, and (e) by contact with dead infected bees.

The investigations and experiments which have been made hitherto seem to indicate that the Isle of Wight disease is due to infection with *Nosema apis*, but that the symptoms of the disease and the growth of the parasite within the affected bees are greatly influenced by various conditions.

It has frequently been represented to the Board of Agriculture and Fisheries that the scarcity of store cattle is due in no small measure to the excessive

**Slaughtering of
Young Calves.**

slaughtering of young calves. The matter is of so much importance that the Board think it desirable to publish the following copies of letters which have recently passed

between one of their correspondents and themselves on the subject.

Milfield, Alnwick,
Northumberland.

May 23, 1911.

SIR,—As one of the largest land agents in this county, and as one of your oldest surveyors, may I be permitted to call the attention of the Board to the scarcity, and consequent prohibitive price of store cattle.

At the present moment the live-weight price of good stores in this county ranges from about 42s. to nearly 50s. per cwt. A normal price, at this season, would be about 36s. or thereabouts, and at that price, feeders require to sell the fattened animal, in the following spring, at about the same price per cwt., namely, 36s. (net), in order to avoid loss. Beef is a shilling or two per cwt. above that figure at present, but not sufficiently far above it (even if the same price prevails next year) to justify the present price of stores, and feeders are therefore buying it at a level which means certain loss. They know this very well, but they cannot help themselves, they cannot get cattle cheaper.

Store prices have been gradually rising since 1905. The figures published by the Teviotdale Farmers' Club show this clearly. They are as follows :—

Year.	Yearlings.			Two-year olds.		
	£	s.	d.	£	s.	d.
1905	7	15	0	11	5	0
1906	8	0	0	11	15	0
1907	9	0	0	12	7	6
1908	9	12	6	13	10	0
1909	9	10	0	14	0	0
1910	10	0	0	14	10	0
1911	Not yet determined, but higher still.					

In five years the increase in price has been nearly 30 per cent., and the returns of 1911 will carry the level even beyond that figure.

The certainty of loss accruing to the feeders is not the only untoward circumstance which arises from this state of affairs. The sheep industry is certain to be affected, and that unfavourably. Summering cattle are absolutely necessary for keeping pastures in a condition suitable for sheep; the dearth of stores means that pastures are not being adequately stocked with cattle, and grazings will, in consequence, become unsuitable for sheep. This is an important point to keep in mind in considering the question.

From all points of view it is desirable that attention should be directed to this subject for the purpose of ascertaining whether anything can be done to remedy, or, at any rate, ameliorate, the existing state of affairs.

I do not advocate opening our ports to foreign store cattle, or to those from Canada or elsewhere. Apart from the question of disease, I do not think the number which would come in would materially affect the situation.

But we do not really need, in my opinion, to go abroad for our stores; we breed sufficient in the United Kingdom to serve all purposes, if the whole of those already bred were allowed to reach maturity.

According to the Agricultural Returns of 1910, there were in the United Kingdom in June, 1910, 4,342,186 cows and heifers in milk and in calf. Apart from barren animals and casualties these would produce:—

Within the twelve months, a calf a-piece	... ..	4,342,186
Allow for casualties 15 per cent.	... ..	<u>651,327</u>
We might expect to find under one year old	... ..	3,690,859
The Returns show of animals under one year	... ..	<u>2,516,707</u>
Shortage...	... ..	<u><u>1,174,152</u></u>

In other words, over a million calves are wasted each year, and if these, instead of being wasted, were allowed to live, our store stocks would be increased by 46 per cent.

I take it most of the animals forming the shortage are killed for veal.

It seems to me some attempt should be made to encourage the keeping of such calves instead of sending them to slaughter. We do not, I think, need even to save them all; if half were saved, it would probably suffice.

Great Britain is a worse offender in this respect than Ireland, for while in Great Britain 2,767,618 cows and heifers gave 1,396,952 yearlings—50 per cent., Ireland with 1,557,584 gave 1,110,986 yearlings—71 per cent.

If, therefore, the Irish standard could be reached in Great Britain, we would obtain half a million more stores per annum, and this would certainly relieve the situation very materially and probably meet the case entirely. What is done in Ireland might, I should imagine, be possible in Great Britain.

The question is what steps could be taken which would,

at the same time, be politic and practicable. I should not myself hesitate to prohibit the slaughtering of calves for sale as veal, but I of course recognise that any such proposal is out of the question, for various reasons which need not be specified.

But I think something might be done by the Board on voluntary lines:—

1. If the Board were to collect, from thoroughly reliable sources, in each county, correct data as to the prices of stores now prevailing, and to take steps to have the information so obtained widely disseminated in the proper quarters, those who now slaughter calves for sale as veal would doubtless be led to consider whether their interests would not be better served by putting their calves into the store market.

2. A system of co-operation might easily be arranged by Farmers' Unions and kindred societies, whereby those who want calves to rear would know where and how to get them at the times they required them. At present there is no such arrangement, and one district may be in the position of having to sacrifice calves for lack of demand, while other districts cannot get them for lack of supply. The principal Unions and Societies would, no doubt, give this matter their careful consideration if the question came before them from the Board of Agriculture.

3. The sentimental aspect is worth consideration. The slaughter of very immature animals, like calves a fortnight or three weeks old, is distinctly repugnant to many natures. The sight of these carcasses in butchers' windows is almost loathsome. The action of the late Queen in discouraging the killing of "lamb" had some effect for, at any rate, a time; a similar expression of feeling from an equally high quarter might, at present, have an important influence on the trade in veal. Whatever may be considered the best method of procedure, I think it cannot be denied that something needs to be done, and that as speedily as possible, and I call the Board's attention to the subject in the hope that some means may be devised whereby the hardships following the present scarcity of store cattle may be removed or relieved.

I am, etc.,

The Secretary,
Board of Agriculture.

(Sd.) GEORGE GREY.

To this letter the Board sent the following reply, dated 21st June, 1911 :—

SIR,—I am directed by the Board of Agriculture and Fisheries to advert to your letter of the 23rd ult., suggesting the adoption of measures with a view to remedying the alleged scarcity of store cattle in Great Britain, and in reply I am to say that the facts to which you have called attention are fully recognised by the Board. The excessive slaughter of calves appears to them to be due not so much to the extent of the public demand for veal, as to the inconvenience to the dairy farmer of maintaining and rearing calves when the object which he has in view is to increase his supply of milk for sale.

The Board agree that the dissemination of information as to the prevailing prices of store cattle is useful as a means of enabling the farmer to determine whether it is to his advantage to put his calves into the store market instead of slaughtering them, and this is one of the purposes which led the Board to publish a Weekly Return of Market Prices, compiled from data collected from a large number of markets in Great Britain. The Return is issued every Saturday and may be obtained direct or through any bookseller from Wyman & Sons, Fetter Lane, E.C., or Oliver & Boyd, Edinburgh, price 1d. A copy of the Return for the week ended the 15th inst. is enclosed for your acceptance.

As the production of milk for the sole purpose of sale increases, the difficulty experienced by the dairy farmer of finding a local purchaser for his calves who really wants them for rearing increases in like proportion, and the question as to what can be done to facilitate the easy and rapid transfer of young calves from the cow owner to farms adapted for their rearing without detriment to the condition of the animals, is a very important one. It is anticipated that some system of co-operation between farmers whereby this object could be achieved will form a fundamental part of any scheme for the improvement of cattle breeding, which may be framed by the Board under the Development and Road Improvement Funds Acts.

The difficulty of successfully feeding young calves with milk substitutes is a further cause of their being slaughtered. The rise in the demand for milk leaves much less for the calf

than formerly, and knowledge and experience are necessary to render feeding with substitutes a commercial success. The Board consider that the further facilities for agricultural education and demonstration, which will, they hope, be provided shortly, may be expected to provide further information on this subject.

A short article appeared in the Board's Journal for December, 1910, as to the practice of farmers with regard to the disposal of their calves, and an early opportunity will be taken of dealing more fully with the subject in the same publication. A leaflet on the subject of calf-rearing has been issued by the Board, and can be obtained at any time by persons interested in the matter, post free, on application to the Secretary, Board of Agriculture and Fisheries, 8, Whitehall Place, London, S.W.

I am, etc.,

(Sd.) T. H. ELLIOTT,

Secretary.

George Grey, Esq.,
Milfield,
Alnwick.

THE Royal Commission appointed to inquire into the relations of Human and Animal Tuberculosis have recently issued their Final Report (Cd. 5761. Price 6d.) which contains an account of the investigations carried out, and sets forth certain conclusions based on the results of the Commission's researches.

**Human and Animal
Tuberculosis.**

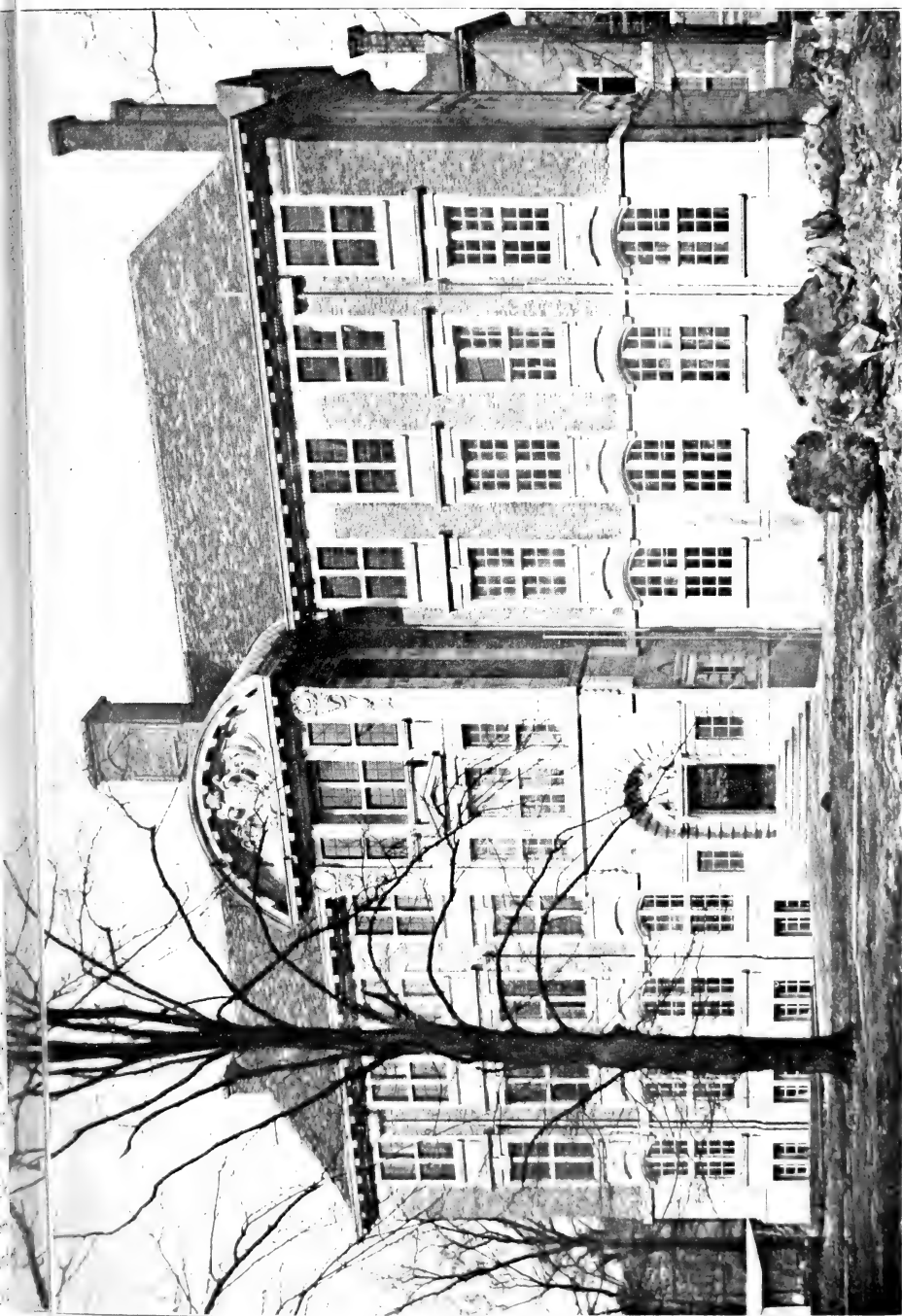
In regard to the question whether tuberculosis in animals and in man is one and the same disease, it is considered that on certain points there is room for difference of opinion, but that whether one prefers to regard bovine tuberculosis and the cases of tuberculosis in man which are caused by the human type of bacilli as varieties of the same disease or as independent diseases, there can be no question that human tuberculosis is in part identical with bovine tuberculosis. The researches of the Commission have proved that in a considerable proportion of cases of the human disease the lesions contain, and are caused by, bacilli

which are in every respect indistinguishable from the bacilli which are the cause of tuberculosis in cattle. In all such cases the disease therefore is the same disease as bovine tuberculosis.

They further conclude that mammals and man can be reciprocally infected with tuberculosis, and that a considerable amount of the tuberculosis of childhood is to be ascribed to infection with bacilli of the bovine type, transmitted to children in cow's milk. The danger to the adult human subject appears to be substantially less.

In the interests therefore of infants and children, and for the reasonable safeguarding of the public health generally, the Commissioners urge that existing regulations and supervision of milk production and meat preparation should not be relaxed; that on the contrary Government should cause to be enforced throughout the kingdom food regulations planned to afford better security against the infection of human beings through the medium of articles of diet derived from tuberculous animals.

More particularly, action in this sense is urged in order to avert or minimise the present danger arising from the consumption of infected milk. And in this connection it is pointed out that bovine tubercle bacilli are apt to be abundantly present in milk as sold to the public when there is tuberculous disease of the udder of the cow from which it was obtained. This fact is generally recognised though not adequately guarded against. But these bacilli may also be present in the milk of tuberculous cows presenting no evidence whatever of disease of the udder, even when examined post-mortem. Further, the milk of tuberculous cows not containing bacilli as it leaves the udder may, and frequently does, become infective by being contaminated with the fæces or uterine discharges of such diseased animal. Measures for securing the prevention of ingestion of living bovine tubercle bacilli with milk would greatly reduce the number of cases of abdominal and cervical gland tuberculosis in children, and such measures should include the exclusion from the food supply of the milk of the recognisably tuberculous cow, irrespective of the site of the disease, whether in the udder or in the internal organs.



THE SCHOOL OF AGRICULTURE, CAMBRIDGE UNIVERSITY.



SOME account of recent developments in agricultural education at Cambridge may prove of interest to readers of the

JOURNAL.

**School of
Agriculture,
Cambridge.**

The first suggestion that agriculture should be included as one of the subjects of study in the University seems to have come from Mr. Henry Chaplin in 1890, when, in a letter written in his capacity as President of the Board of Agriculture to the late Duke of Devonshire as Chancellor of the University, he suggested the establishment of an Agricultural Department. A syndicate was appointed to consider the question, but the full recognition of the subject was not attained till 1899, when, with the help of the Worshipful Company of Drapers, a chair of Agriculture was permanently endowed.

The first occupant of the chair was Dr. William Somerville, during whose tenure of office, from August, 1899, to December, 1901, the Department obtained a farm for teaching and research. This was brought about by the generosity of Mr. W. A. Macfarlane Grieve, of Clare College, who leased to the University rent free for nine years, 140 acres of land at Impington, four miles from Cambridge. Dr. Somerville resigned to take office under the Board of Agriculture and Fisheries, and was followed by Mr. T. H. Middleton, who occupied the chair until 1907, when he, too, left Cambridge to take up the position of Assistant Secretary to the Board of Agriculture. Chiefly on the initiative of Professor Middleton, a scheme for the provision of a permanent home for the Agricultural Staff was taken in hand. The first aid in this direction was given by the Drapers' Company, who had already so generously endowed Agriculture. The Company offered to give £5,000 to a building fund provided that £5,000 could be raised elsewhere. The late Duke of Devonshire, then Chancellor of the University, assisted by a Committee of the Cambridge University Association, issued an appeal for funds, which brought in the necessary £5,000 by June, 1906. Before his Grace's last illness over £13,000 had been subscribed or conditionally promised. Subsequently, the present Duke became chairman of the Committee, and after nearly two years' continuous collecting, the fund was brought to the desired amount of £20,000.

Meanwhile the University had assigned an excellent site, plans were obtained from Mr. Arnold Mitchell, F.R.I.B.A., and the building shown in the accompanying illustrations is the result.

The building consists of three floors, a basement, and attics. In the *basement* are the heating apparatus, the store-rooms, a room for preparing samples for analysis, and a machinery room.

On the *ground floor* is the large lecture hall fitted with museum cases. This floor also contains the office and library, and private rooms for the Professor of Agriculture and the Lecturer in Agriculture. Also a third private room at present occupied by the Reader in Forestry.

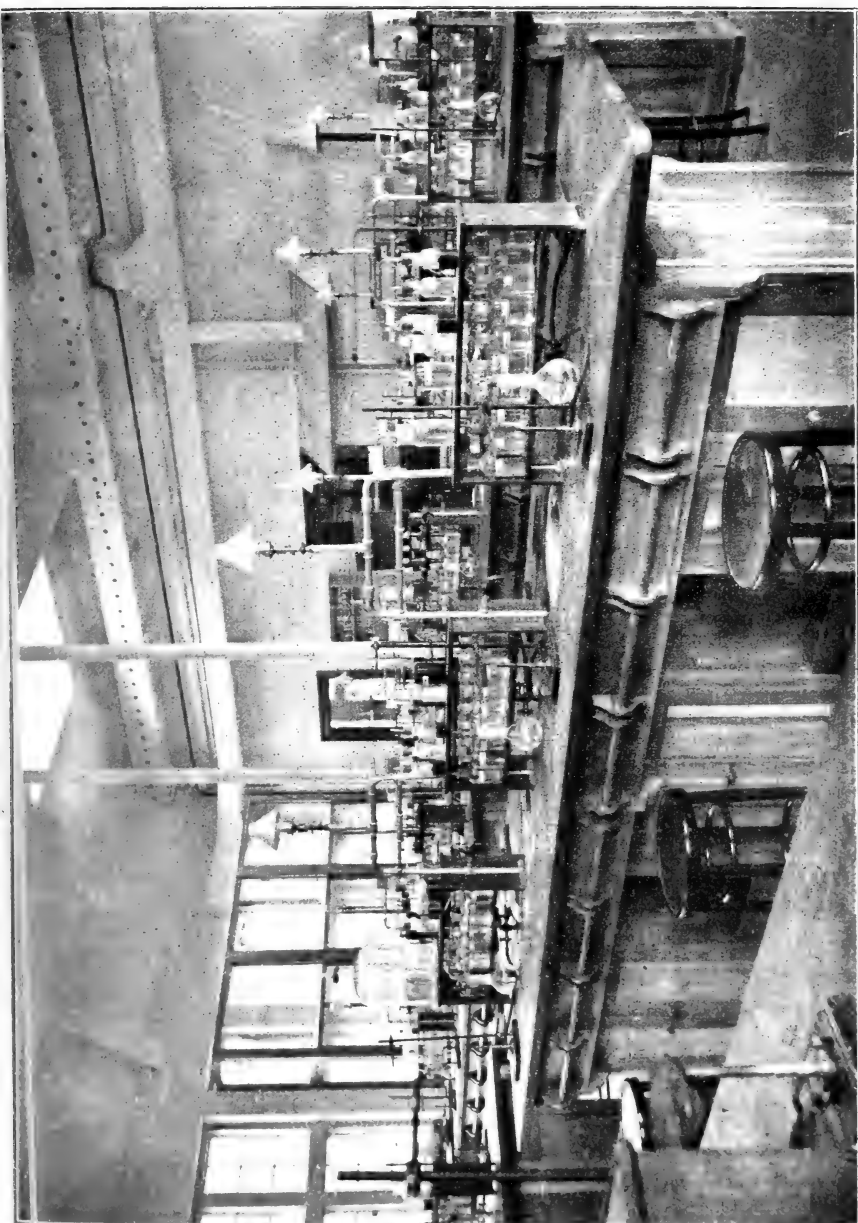
The first floor is devoted to the biological sciences as applied to agriculture. It contains a lecture room, elementary and advanced biological laboratories, and private rooms for the Professor of Agricultural Botany, the lecturers in Agricultural Physiology and Zoology, and the consulting zoologist and botanist of the Royal Agricultural Society of England, who are at present members of the Staff.

The second floor is designed for agricultural chemistry and physics, and contains a lecture room, a large elementary laboratory, an advanced laboratory, a balance room, a preparation room, and two private rooms for research.

The attic floor extends over the east half of the building and contains a greenhouse, a photographic dark room, and considerable storage space at present occupied by a collection of timbers which will be transferred ere long to a separate forestry building.

The building is designed to accommodate an elementary and an advanced class each of about 50 students. When the plans were made the total number of students of agriculture was only just over 40, but since then the numbers have more than doubled. The elementary class now contains over 50 students, and the advanced class over 30, and there are about 15 students on the books who only attend single classes. The teaching staff numbers ten, exclusive of the Reader and Lecturer in Forestry.

The Department has outgrown the Impington Farm, and now occupies a holding of about 230 acres belonging to Trinity and Clare Colleges, situated near the Observatory



SCHOOL OF AGRICULTURE, CAMBRIDGE. THE ELEMENTARY CHEMICAL LABORATORY.



between the Madingley and Huntingdon Roads, and within little more than a mile of the laboratory.

The accommodation provided by the new building is taxed to the utmost, especially in regard to providing room for research work, of which the amount now being done is considerable.

The Chemical Department has been engaged, for the last three years, in an important investigation of the properties of the protein of linseed. It is expected that a method will be devised which will shorten in a very marked degree the time required for research of this nature. The routine methods of hydrolysis, esterification, and separation of the amino acids have required, in the case of linseed, nearly two years of continuous work. It is hoped that the new method, when perfected, will shorten the work of protein analysis very considerably. Investigations on the composition of mangolds have been going on for many years, and useful results have been published. Recent work has led to the separation from mangold roots of a non-protein nitrogenous body, which will be investigated with a view to ascertaining the part played by such bodies in nutrition. It would appear that the value of protein substances in feeding stuffs is influenced by the nature of the amides to which they are linked, as well as by the composition of their respective proteins. With this investigation Dr. Hopkins of the Physiology School will be associated. With the aid of the Development Fund, a new laboratory for experiments on the digestibility of foods is being erected on a site adjoining that of the Animal Institute on the outskirts of the town. The latter was, until recently, maintained by four of the Professors for the purpose of experiments on animals. It has now been acquired by the University with funds provided by the Development Commission. At the Institute, experiments are now being conducted in connection with tick-borne diseases of cattle, the effects of castration and spaying of pigs and sheep, the pigmentation of the fatty tissues in swine, and digestibility of foods.

A bee-house has been recently erected for the prosecution of research on the Isle of Wight bee disease.

Another problem under investigation in the Chemical

Department relates to the part played by the mucilage in linseed. It appears that this substance is not affected by the digestive juices, but under the action of bacteria is split up in the small intestine into substances which may be of use in the animal economy.

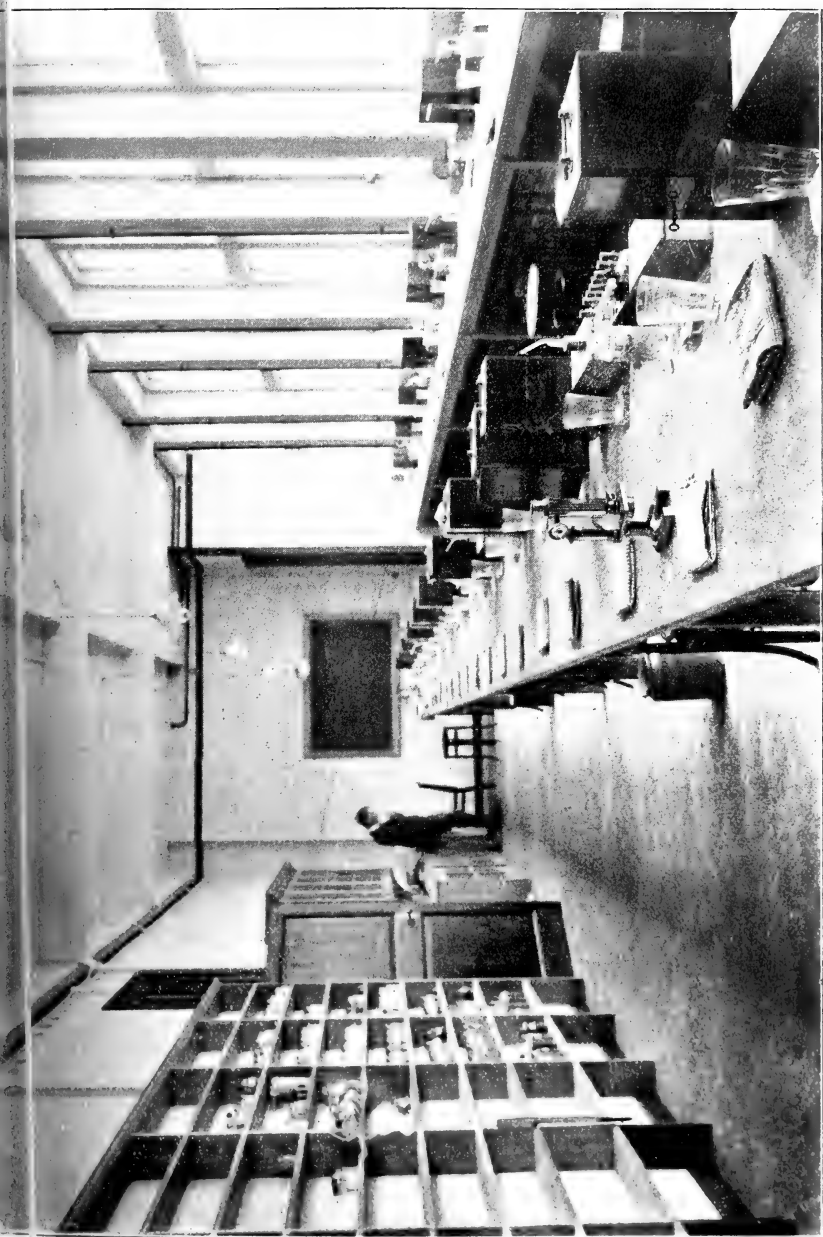
Investigations on the "strength" of flour are also going on. A rapid and accurate physical method of estimating the strength of flour has been discovered. Hitherto the only method was a baking test requiring a considerable quantity of flour for carrying it out. The new method is applicable to single grains of wheat.

Soil surveys of Norfolk, Hunts, and Salop have recently been completed, and await publication. Surveys of Cambridgeshire and the Isle of Ely are being undertaken. Four research students are engaged on this branch of the work.

In the Botany Department investigations are in progress on silver leaf disease. An investigation of the microflora of the soil of the Woburn experimental farm is in progress and tends to indicate that the effects of manures in altering the soil flora may be the primary cause of the observed variations in fertility.

Work is also being done on "Bigbud" in black currants, and, concurrently, investigations have begun with a view to ascertaining the extent to which individual plants are immune or resistant to insect attack. This inquiry has been suggested by the observed fact that the immunity to attack by American aphids varies considerably from one individual to another of the same variety. Certain bacterial diseases of the potato are also under investigation.

On the College farm the work on cereal breeding, for which the Department is so justly distinguished, is being continued. Two useful varieties of wheat, one rust-resistant and a prolific yielder, and the other a strong wheat combining the quality of Fife and the cropping capacity of the best English varieties, are now fully established on a field scale, and a beginning has been made in combining in one wheat the desirable qualities of these two. Small field plots of wheats suitable for the special conditions of the Fens will be harvested this year. It is hoped that experiments in breeding improved clovers will soon be under way.



SCHOOL OF AGRICULTURE, CAMBRIDGE. THE ELEMENTARY BOTANICAL LABORATORY.



In the Physiological Department, also, much interesting work is being done. The experiments in spaying mentioned in connection with the Animal Institute are being conducted by this Department. The pigmentation of the fat of swine is also being investigated, a matter that is of great interest to the bacon industry. At the farm, an investigation on the body temperature of cattle is being conducted in collaboration with the Lecturer in Agriculture. This question has an important bearing on the use of the tuberculin test. An experiment on the crossing of Merino with Shropshire sheep, with a view to combining the wool of the first with the constitution of the second, is in progress.

The Biological Department of the University is engaged on a number of investigations on the breeding of poultry, the necessary accommodation having been provided on the University Farm.

It is probable that the energies of the Cambridge School as regards research will in the future be mainly directed to plant breeding, animal nutrition from the chemical as well as the physiological side, and animal breeding. It will be seen from the above account that considerable progress in connection with these subjects has already been made.

THE Rural Education Conference which was constituted by the Presidents of the Board of Agriculture and Fisheries and the Board of Education in June, 1910,

**A Suggested Type of
Agricultural School.**

have had under consideration for some time a reference from the two Boards "as to whether there is any place in the system of Rural Education either generally or in particular counties, in view of special local conditions, for schools giving to boys leaving Elementary Schools a three years' course from the age of 12 or 13 in the Theory and Practice of Agriculture, together with continued general education." This question was referred to a committee for detailed consideration, and the Conference have now presented a Report* on the subject. As regards boys who intend to get their living, at all events at the outset, as agricultural labourers, the report states:—"We understand that the type of school intended is one

* [Cd. 5774.] Messrs. Wyman & Sons. 3d.

where these boys will be given a suitable general education, in which the manual side will be fully developed, and theoretical and practical instruction in agriculture and its processes in order to make them more efficient labourers. We have come to the conclusion that there is at present no general demand for such schools, and that there is no place in the system of rural education for schools of this exact type being carried on continuously throughout the week."

Two main considerations influenced the Conference in coming to this conclusion. In the first place, the Report says, there appears to be a consensus of opinion among practical agriculturists that boys of this class who intend to live upon the land should get on to the land and into practical work on the land as soon as possible after leaving an Elementary School. In the second place, schools of the type contemplated in the reference would usually have to be boarding schools, to which the parents of boys of the labouring classes could only afford to contribute very low, if any, fees. Moreover, parents would have to forego the wages which their sons might otherwise earn.

As regards boys who intend to become farmers or small occupiers, the Conference are of opinion that different considerations attach, and that for them something beyond the ordinary Elementary School is required. In districts where Secondary Schools giving specialised rural instruction exist, and the fees and boarding charges are low enough to admit of the attendance of the sons of small farmers, the Conference consider that no further facilities for rural education for that class of boy up to the age of 16 can reasonably be required.

But, the Report points out, however much encouragement is given to the development of rural Secondary Schools, and to the improvement of rural instruction in the ordinary rural Elementary Schools, there is still room in certain districts for the trial by way of experiment of one or other of two new types of school.

One of the types, adapted to the instruction of future farmers, which the Conference suggest, would be akin to the present "Higher Elementary School" specialised in an agricultural direction. This type of school, which has not

hitherto been tried in England, appears to the Conference to give much more promise of success than schools professedly giving a large amount of instruction in practical agriculture, such as "fermes écoles," which have proved unsuccessful in France. The Report discusses the curriculum of these schools, which might be termed "Higher Grade Rural Schools," and recommends that, as regards the school fees, it might be left to the local authority to determine whether the instruction should be given free, or whether a moderate charge should be made to the ordinary pupil, with a fair provision of free scholarships. If these schools are to serve a large district, provision will have to be made out of public funds for boarding allowances and travelling expenses.

Another type of school which the Conference consider worth trying as an experiment is what the Report terms a "Centralised Rural Continuation Day School," to which boys actually engaged in work on the land between the ages of 12 and 16, or even 18, might be brought in several sets for one or two days a week. Such schools would serve areas (not exceeding a radius of 8 to 10 miles) which would vary in size according to the local conditions. They would usually consist of one or more rooms, well equipped for manual work, large enough to accommodate a class of not more than 20 boys under the charge of one specially trained master. While their general education would be continued, the students would also receive instruction in elementary science and rural economy with direct bearing on their actual employment.

THE Board of Agriculture and Fisheries have received information that the Mustard Beetle (*Phædon betulæ*) is doing much damage in some districts this season. The Board would therefore direct attention to measures which may be adopted to combat this pest.

**The Mustard
Beetle.**

The beetles hibernate in various shelter-places, e.g., in the mustard stubble, in the hollow stems of other plants in the neighbourhood of the food plants, and in crevices of many kinds. Eggs are laid in spring and summer, and both grubs and beetles feed on the growing plants. Pupation of the grubs takes place in the soil. The mustard beetle may be attacked in five ways:—

(1) By shaking the beetles off the plants into troughs coated with tar, or into vessels containing paraffin.

(2) By dislodging and trapping the beetles by dragging tarred sacking just above or between the young plants when the beetles are observed on them. The strips of sacking must be light, in order not to injure the plants.

(3) By spraying the infested crop with arsenate of lead, which may be obtained ready for use in the paste form, and may be employed at the rate of 4 lb. of the paste to 100 gallons of water. It may also be prepared by dissolving 35 oz. pure or crystallized arsenate of soda in 50 gallons of water, dissolving 70 oz. acetate of lead in 50 gallons of water, and mixing the two solutions; or by dissolving 20 oz. dry, crude, or commercial arsenate of soda in 50 gallons of water, dissolving 70 oz. acetate of lead in 50 gallons of water, and mixing the two solutions.

(4) It has been observed that later in the year the beetles sometimes migrate in great numbers to other fields, and if this be noticed a shallow trench should be dug across the path of the migrating swarm; if the trench be kept tarred many beetles will be caught, notwithstanding the fact that they have wings.

(5) After an infestation the stubble may be burnt over before ploughing in order to destroy hibernating beetles.

An interesting experiment in the direction of introducing into the rural districts of this country special "party" line telephones for the use of farmers and other rural residents, such as were described in the JOURNAL for July, 1911, p. 326, is being tried in the Brandsby district of Yorkshire. The annual rental for each telephone on such a line has been provisionally fixed at £3, with an unlimited local service during the ordinary official hours at the Post Office.

**An Example of
the Introduction
of Farmers'
Telephones.**

The Brandsby system has been in use since November last, and appears to be giving satisfaction to the subscribers, who have now the benefit, under certain conditions, of all the facilities afforded by the telephone system.

The telephones have been used to an appreciable extent for (a) local calls to other subscribers who rent exchange lines at the ordinary rates, (b) intercommunication among the party-line subscribers themselves, and (c) trunk calls.

It has been ascertained that trunk calls can be made satisfactorily to places within a distance of no less than 180 miles, although no calls have actually been made by subscribers for such places.

The experimental introduction of the system at Brandsby has been greatly facilitated by the enthusiastic support accorded to it by Mr. Hugh Fairfax Cholmeley, who has not only taken keen interest in the matter, but has also granted free wayleaves for the erection of a number of poles on his private property.

SUMMARY OF AGRICULTURAL EXPERIMENTS.

SOILS AND MANURING.

Manuring of Oats and Mangolds (*Experiments at Kineton, Warwickshire, 1910*).—These experiments have been carried out since 1901 by Mr. Ernest Parke, J.P., with the co-operation of Dr. Bernard Dyer.

When the farm was taken over it was in very poor condition, owing to long-continued neglect of manuring. The soil consists of heavy clay loam poor in available phosphoric acid, but indicating, on analysis, a sufficiency for the present of available potash. The experimental plots have been marked out from year to year in various parts of four different fields as convenience of cropping dictated.

In the case of the oats, the crop was spoilt by weather in 1909. In the other eight years the average crop with no manure was $38\frac{3}{4}$ bushels per acre; with 3 cwt. superphosphate per acre it was 49 bushels; 1 cwt. nitrate of soda in addition increased this to $56\frac{3}{4}$ bushels, and 2 cwt. nitrate of soda to 65 bushels. In the case of the mangolds the plant failed in 1906 and 1909, and only the average of the other seven years is considered. The crops were as follows:—

	tons	cwt.
No manure	17	16
4 cwt. super	24	10
4 cwt. „ and 2 cwt. nitrate of soda	32	2
4 cwt. „ „ 4 cwt. „	38	0
4 cwt. „ „ 6 cwt. „	43	7

Dr. Bernard Dyer remarks that the experiments, which are being continued, appear to show that even land that has become through bad farming locally notorious for its poverty, may be possessed of sufficient inherent capability to yield abundant crops if treated with the proper fertilisers, and to give at the same time a good profit by their use.

Manuring of Grass Land (*Results of Grass-Manuring Experiments. Dr. Bernard Dyer and Mr. F. W. E. Shrivell, 1910*).—These experiments were carried out at eight stations in various parts of England and Wales. The general scheme is that one acre is set aside and divided into eight plots, which are manured annually with different dressings. The main crop is cut for hay, and the yield of each plot is given in the report.

Manuring of Grass Land (*Univ. Coll. of North Wales, Agric. Dept., Bull. 3, 1910*).—An experiment was carried out on a field at Quirt that

had been let for grazing for a number of years, and had been dressed with no other manure than basic slag. Various combinations of potash and phosphates were applied, but with no striking results on the weight of crop. A considerable effect was produced, however, on the quality of the herbage. Where no manure was used it was poor and full of weeds, containing little clover; but on the manured plots white clover was abundant, and there was some red clover.

Manuring for Milk (*Midland Agric. and Dairy Coll., Bull. 1, 1910-11*).—This experiment was begun in 1909 for the purpose of ascertaining whether superphosphate and sulphate of potash would give profitable returns on pasture land used for grazing cows for milk. A field in poor condition adjoining the college farm was taken, and two plots of four acres each were fenced in. The soil was of a strong, clayey nature, typical of most soils on the Keuper Marl formation. On account of indications of lack of lime, 10 cwt. per acre of ground lime was applied on both plots in the spring of 1909. On one plot 4 cwt. of superphosphate and $1\frac{1}{2}$ cwt. of sulphate of potash were applied immediately afterwards, while to the other plot no manure other than the lime was given. No further manures were used in 1910. The effect was tested by comparing the milk yield of the cows. Two cows were grazed on each plot for a fortnight; they were then changed over, the two that had been on the no-manure plot going to the manured plot, and *vice versa*. This continued for five months, so that each lot of cows visited each plot five times. In order to allow the cows time to get accustomed to the different pasture, the milk of the second week of each fortnight only was taken into account, and the amount doubled to represent the fortnight's milk. By thus changing the cows from one plot to the other the effect of differences between the cows was minimised, and the only factor that would influence the result would be the manures applied.

Owing to the manured plot having much improved, a third cow was put on it on May 16th at the same time as the other cows, and kept on the same plot till the end of the season. In 1909 the third cow was introduced in July. During the five months the yield of the two cows while on the unmanured plot was 6,688 lb., and while on the manured plot 6,841 lb. The yield of the third cow on the latter plot was 3,392 lb., so that the total excess on the manured plot in 1910 was 3,545 lb., or 86 gallons, per acre. This confirms the result obtained in 1909, when an increase of 84 gallons per acre was obtained. The milk yield of the unmanured plot was 1,157 lb. more than in 1909, which would appear to indicate either an improvement of the pasture from the use of lime, or that it was a better grazing season, or perhaps a combination of the two causes.

Manuring of Seeds Hay (*Midland Agric. and Dairy Coll., Bull. 2, 1910-11*).—This trial has been carried out during four years at twenty centres altogether, in order to find whether seeds hay could be profitably manured, and if so, the best mixture for the purpose. Twelve plots of one-twentieth acre have been manured at each centre, care being taken to choose land as even as possible in character. Two plots were left unmanured, two received nitrogen and phosphates, and six complete dressings of varying composition. Taking the average of the twenty trials, the most profitable results have been given by the following two complete mixtures:—(1) 100 lb. sulphate of ammonia,

208 lb. superphosphate, 200 lb. kainit; (2) 100 lb. sulphate of ammonia, 208 lb. superphosphate, 50 lb. muriate of potash. These both gave an increase of about 10 cwt. of hay over the unmanured plot, which, at £3 per ton, is calculated to leave a profit, apart from residual value, after allowing for the cost of the manures, of about 10s. per acre.

Manuring of Potatoes (*Midland Agric. and Dairy Coll., Bull. 3, 1910-11*).—A trial of the effect of artificial manures in addition to the usual farmyard manure was made at four centres in Lincolnshire and at the College farm. The conditions and soil varied somewhat, and at one centre no farmyard manure was used. The best yield was obtained from a mixture of $1\frac{1}{2}$ cwt. sulphate of ammonia, 4 cwt. superphosphate, and $1\frac{1}{2}$ cwt. sulphate of potash per acre, with from 12 to 20 tons of farmyard manure. This dressing cost 44s. per acre, and gave an average increase in crop over the plot without artificials of 32 cwt. of ware potatoes. Various other mixtures, including nitrate of lime, calcium cyanamide, fish meal, and some proprietary potato manures gave smaller increases for a similar cost of manure.

Manuring of Mangolds (*Midland Agric. and Dairy Coll., Bull. 4, 1910-11*).—In the course of preliminary trials extending over five years, a standard dressing of artificials for use with farmyard manure for mangolds was determined, and during three subsequent years this dressing has been further tested, and has given the best results. It is made up as follows:—Sulphate of ammonia, 100 lb., applied at seeding; nitrate of soda, 130 lb., at singling; superphosphate, 750 lb., at seeding; either sulphate or muriate of potash, 120 lb., at seeding; and common salt, $2\frac{1}{2}$ cwt. applied in March. This was used in addition to from 10 to 25 tons per acre of farmyard manure. It cost 55s. 6d. per acre, and in any year always on the average gave a profit, the mangolds being valued at 12s. 6d. a ton.

Superphosphate or Mineral Phosphates for Swedes (*Midland Agric. and Dairy Coll., Bull. 7, 1910-11*).—It is commonly thought that soluble phosphates are desirable as being more available for the immediate requirements of the plant, but there is every reason to believe that soon after they are applied to the soil they combine with lime, and are more or less completely changed to the insoluble form. There are consequently good grounds for thinking that the practical value of soluble phosphates is due, not so much to their being taken up in that state by the plant, but to the solubility ensuring minute sub-division and even distribution throughout the soil particles. If fineness of division is the object in view, it was thought that an experiment could be usefully carried out to ascertain whether the same object could be obtained by reducing ordinary mineral phosphates to a fine powder, thus saving the cost of treating them with acid to form superphosphate. The experiment forms, therefore, a comparison between the mechanical and chemical preparation of phosphates. Nitrate of lime is also being tested, as well as the effect of ground lime, in order to see whether there is reason for the opinion that insoluble phosphates are more beneficial on soils lacking in lime and rich in organic matter.

This report contains the results which have been given by 500 lb. superphosphate, 173 lb. Florida phosphate, and 250 lb. Charleston phosphate, these amounts containing equal quantities of phosphate. As the experiments have only been in progress for one season it would be premature to draw conclusions at present, but they are sufficient

to show that the mineral phosphates are likely to be well worth attention in the problem of swede manuring.

LIVE STOCK.

Fecundity of Sheep (*Royal Agric. Coll., Cirencester, Scientific Bull. No. 2, 1910*).—It is generally held that, in the case of animals having usually one or two young at a birth, the disposition to bear twins is hereditary, and this work has for its object the investigation of the point in the case of sheep. In July, 1909, twelve pedigree Oxford Down twin theaves were purchased, six from mixed twins, and the other six from ewe twins. (In this report the three kinds of twins are spoken of as (1) ram twins, *i.e.*, both male; (2) ewe twins, *i.e.*, both female; (3) mixed twins, *i.e.*, one of each sex.) In the autumn these theaves were put to a pedigree Oxford Down ram twin, and lambs were dropped as follows:—

- Lot I.—Mixed Twin Ewes ... 9 lambs from 6 ewes, including 2 pairs of
(1 ewe died after lambing) mixed twins and 1 of ewe twins.
Lot II.—Ewe Twins ... 5 lambs from 5 ewes. No twins.

The next season, with the same ram and ewes, the results were:—

- Lot I.—Mixed Twin Ewes ... 9 lambs from 5 ewes, including 3 pairs of
mixed twins and 1 pair of ewe twins.
Lot II.—Ewe Twins ... 6 lambs from 6 ewes. No twins.

All the twins were borne by the ewes from mixed twins, and the ewe twins nearly all produced ram lambs. The experimental flock is too small, however, and the results so far obtained too few, to justify more than very tentative conclusions.

Breeding from Ewes at an Early Age (*Jour. South-Eastern Agric. Coll., No. 19, 1910*).—The object of this experiment is to find to what extent breeding from ewe tegs (*i.e.*, tupping at seven months instead of at one year and seven months) may be carried on without appreciably reducing the size, vigour, and constitution of the ewes. From the results in 1909 it was calculated that the production of a lamb in the first year entailed a loss of 5s. 8d. on the ewe, compared with those that were not bred from. In November, 1909, the same two lots of ewes were mated with a Southdown ram lamb, *i.e.*, both lots were twenty months old; one lot was mated for the second time, and the other lot for the first time. Forty-three ewes gave birth to fifty-four lambs, three ewes being barren. All the lambs did well, and there was no noticeable difference between those from the two lots of ewes. The weighing in 1910 took place on September 8th—seven weeks earlier than in the year before, as both lots were sold at the autumn sales. Owing to this there was an all-round decrease in weight compared with 1909, a decrease that is much greater in the case of the ewes that had only been bred from once, although these still remained ahead of the others in average weight. At this time (thirty months) the average live weight of the ewes that had had two lambs was 101 lb., and of those that had had one 110·7 lb. There was thus a difference, owing to the lamb in the first year, of 9·3 lb. At 4d. per lb. this would be worth 3s. 1d., and the loss of 5s. 8d. in the first year was reduced to that amount.

INSECT AND FUNGUS PESTS.

Potato Spraying with Woburn Bordeaux Paste (*Jour. of Dept. of Agric. and Tech. Instruc. for Ireland, Vol. xi., No. 3, April, 1911*).—

The spray generally used in Co. Louth, where these experiments were carried out, is Burgundy Mixture, or soda Bordeaux, made with 8 lb. sulphate of copper, 10 lb. washing soda, and 40 gallons of water. With this was compared the Woburn Bordeaux Paste, which is made according to the formula of Mr. Pickering, Director of the Woburn Experimental Fruit Farm. It contains about two-fifths the amount of copper sulphate in ordinary Bordeaux mixture, and no excess of lime, and was found by Mr. Pickering to be much more efficient than the ordinary kind. In addition, milk of lime Bordeaux mixture, containing 8 lb. sulphate of copper, 4 lb. quick lime, and 40 gallons of water, was compared with the above two mixtures.

In 1909 potato blight was not nearly so prevalent as usual, and the results of the experiments were not considered sufficiently conclusive. In 1910 the experiments were carried out at four centres, the soil being a light loam, or, in one case, a limestone loam. At all four centres two plots were tested with the Woburn Bordeaux Paste and the soda Bordeaux mixture respectively, while at three of the centres an unsprayed plot was added, and at two of the centres an additional plot was sprayed with milk of lime Bordeaux mixture. At three of the centres two sprayings were given, the first during the first week in July, and the second a fortnight later; at one centre only one spraying was given, viz., in the second week of July. All plots were sprayed at the rate of 120 gallons per acre of the respective mixture at each spraying.

The blight was very virulent in 1910. The Woburn Bordeaux Paste proved not nearly as efficient as soda or lime Bordeaux mixture, the haulms dying down much sooner, and the resulting growth of weeds being much greater on the plot sprayed with the paste. Lime Bordeaux mixture gave much the best results, but was only tested at two centres. The plots sprayed with the soda Bordeaux gave, on the average, 23 cwt. of saleable potatoes more, and 3 cwt. of diseased potatoes less per acre than the plots sprayed with Woburn paste.

Investigations on Potato Diseases (*Jour. Dept. of Agric. and Tech. Instruc. for Ireland, Vol. xi., No. 3, April, 1911*).—The Department of Agriculture for Ireland has established a temporary station at Clifden, Co. Galway, for investigating potato diseases, and this number of the Department's *Journal* contains a full report on the work done during 1910. A few points of interest to potato-growers in Great Britain are noticed here.

"Stalk" or "Sclerotium Disease" (*Sclerotinia sclerotiorum* Mass).—From observation of the position of the affected part on the plants, and from experiments, it is concluded here that plants can be infected directly by this disease, by means of air-borne spores, and that the intermediary action of the soil is not necessary. This is contrary to the opinion usually held, which is founded on some experiments by de Bary. The point is of practical importance, for if infection occurred only from the soil at the base of the plant, remedial measures would need to be applied to the plants at such places only, whereas if the infection is more or less general over the plant, the whole of it would require to be suitably protected. A number of methods of checking the disease were tried. These included dressing the soil with quicklime and with Burgundy mixture, spraying the soil and the plants with Burgundy mixture, lime-washing the stalks, dusting the stalks with lime and sulphur, and spraying with liver of sulphur solution.

The results were disappointing, spraying with liver of sulphur four times during the season being the only treatment that seemed to have any effect in reducing the number of affected plants, and that but a slight one. The most striking results were from two plots where only one row of plants, 3 feet apart, was planted, instead of three rows, as on the other plots. This seems to show that there is far less chance of infection when the plants are well isolated than when they are crowded together, mutually shading each other, and having their stalks surrounded with more or less moist stagnant air. Such wide planting would not be practicable on a large scale, but less close planting than is sometimes seen may be desirable. A number of similar treatments were tried for *Botrytis*, which often accompanies *Sclerotinia*, but without any satisfactory result.

Black Stalk Rot (*Bacillus melanogenes*).—An organism has been isolated and proved to be the cause of this disease. It was shown that the organism is also capable of causing rot in turnips, swedes, carrots, and parsnips, but not in mangolds. Experimental proof of the infection of plants directly from the soil has not been obtained, and this is considered as showing that the soil of Ireland is not as yet much contaminated. The spread of the disease was shown to be mainly due to the unsuspected planting of infected seed potatoes. The danger of using apparently healthy tubers from a previously diseased crop as seed was demonstrated in a remarkable manner, no less than 94 per cent. of the plants derived from the seed succumbing to Black Stalk Rot. Great care should be taken in excluding all infected tubers from the pits, as it was proved that the bacillus can pass through the skin of a healthy tuber, in the absence of wounds, through the breathing pores. Cool, dry conditions prevent the rot from spreading to any degree, and such conditions should be established in making the pits. Affected plants should be removed from the crop and burnt.

Corky Scab (*Spongospora subterranea* Johns.).—Ten varieties of potatoes have been tested, but none have been found immune to the disease. Spore-balls of the organism would seem to pass unharmed through the digestive tract of a pig, and the manure of the animal may be a source of infection to a potato crop treated with it. The canker form of the disease was proved to be more infectious than the spot form. It was found that clean seed may become contaminated before planting by contact with diseased seed. Liming was definitely shown, both in 1909 and 1910, to increase the proportion of diseased tubers in the crop. Several methods of treatment of affected seed tubers resulted in a most satisfactory checking of the disease. These were soaking in formalin solution (1:600) for three hours, soaking in copper sulphate solution (1 per cent.) for three hours, soaking in copper sulphate solution, as before, followed by rolling in slaked lime, soaking in and covering with precipitate of Burgundy mixture for three hours, and wetting the surface and rolling in flowers of sulphur. Where copper salts were used, however, the total yield of tubers was quite considerably reduced. The best yield was given with the formalin treatment, and the next best with sulphur.

None of the methods tried for disinfecting the soil were satisfactory. Lime, chloride of lime, and gas lime were found to increase the amount of disease. Treatment with copper sulphate brought about some reduction of the scab, but also decreased the yield.

Up to the present, the organism has not been found on any plant other than the potato.

Lime-Sulphur Wash (*Jour. South-Eastern Agric. Coll., Wye, No. 19, 1910*).—These investigations were undertaken by Mr. W. B. Burgess with a view to discovering (1) the best proportions of lime and sulphur for making the wash, and (2) the chemical changes which the wash undergoes when exposed to the air under conditions similar to those which obtain when the wash is used as a summer spray. The wash was considered only as a fungicide for use on the leaf in the summer.

The self-boiled lime-sulphur wash is usually recommended for summer use as it contains less sulphur in solution than one boiled over a fire, and is therefore less likely to injure the foliage. It is pointed out, however, that boiled washes can be diluted till they contain the same amount of sulphur as self-boiled, and a much larger volume is thus obtained from the same amount of sulphur.

The aim is stated to be to get the greatest possible quantity of sulphur into solution with the least possible quantity of lime. With this object small quantities of wash were made with five different proportions of the ingredients, ranging from 100 lb. lime, 100 lb. sulphur, and 100 gallons water, to 100 lb. lime, 300 lb. sulphur, and 100 gallons water, and analyses of each were made. The results obtained were insufficient for definite conclusions, but as far as could be judged the proportion of sulphur to lime should not exceed 2:1, and the most satisfactory formula appeared to be either 150 lb. or 200 lb. sulphur to 100 lb. of lime and 100 gallons of water. A wash with 200 lb. sulphur was made under practical conditions with ordinary commercial materials, and contained in solution 184.4 lb. of sulphur and 84 lb. of lime.

The changes in the fluid after spraying were investigated by exposing it in a thin layer on glass plates and examining the changes in chemical composition produced. Mr. Burgess concludes that lime-sulphur wash as a summer fungicide acts in two distinct ways—(1) as a contact spray, the polysulphides in the wash acting in a similar way to liver of sulphur; (2) as a protective coating to the leaves, due to the thin layer of sulphur in a fine state of division deposited from the thiosulphates and polysulphides by decomposition.

This sulphur would be much more efficient than flowers of sulphur for two reasons: (a) the former adheres very closely to the leaves, in fact, cannot be removed by the most drastic washing; thus a very great drawback in the use of flowers of sulphur is overcome. (b) Owing to its fine state of division, the deposited sulphur would oxidise more quickly than flowers of sulphur, and thus prove a more powerful fungicide, as its action probably depends on the formation of the sulphur dioxide.

It is probable that the chief value of lime sulphur wash lies in its use as a means of applying free sulphur to leaves.

As to the question of injury, the polysulphides are the most likely to damage the sprayed plant, as liver of sulphur where used too strong is known to cause severe leaf scorching. However, these compounds have been shown above to be very rapidly decomposed, so their injurious action would not be very prolonged.

Little appears to be known about the action of thiosulphates on host-plants or fungi. Some preliminary trials with sodium thiosulphate

on hop leaves showed that even with 20 per cent. solutions, only insignificant injury was done just at the tip of the leaves. This points to the fact that little injury is likely to come from this source. All possibility of injury would be removed by the first rain after spraying, as all soluble constituents of the wash would be washed off, leaving a layer of free sulphur with a little calcium sulphate or sulphite.

HORTICULTURE AND CIDER.

Pruning of Apple and Pear Bushes (*National Fruit and Cider Institute Report, 1909*).—The bushes on which the pruning experiments are being carried out were only laid out in 1905, and it is too soon yet to draw any definite conclusion. At present it appears that except for very strong-growing varieties, where root pruning is probably desirable to force a crop, and for very weak-growing varieties, where severe winter pruning may be required in the early stages to encourage good wood formation, the less the trees are pruned the better, when both growth and cropping qualities are considered. If this proves to be the case it will confirm the results of pruning experiments carried on under quite different conditions at the Woburn Experimental Fruit Station.

Use of Market Varieties of Apples for Cider (*National Fruit and Cider Inst., Report, 1909*).—Market varieties of apples are usually considered of little value for cider-making, but it has been suggested that more attention should be given to their use, as a means of utilising small, unsaleable fruit, and of avoiding a glut on the market. A number of market varieties grown in the Institute plantations have been analysed, and small-scale tests have been made to ascertain the type of cider produced. From the results it is seen that with very few exceptions the juice is poor in sugar and tannin, while the acidity is high. The rate of fermentation is excessively high for cider purposes. In the report it is stated that it is clear that the use of market fruit alone for cider-making in the usual way can only be extremely limited as regards the type of cider produced. The kind of beverage produced by ordinary methods will be a thin, dry cider, lacking in body and of marked acidity, probably possessing poor keeping qualities, and exceedingly liable to acetification. This has proved to be the case in the few instances where tests on a practical scale have been made at the Institute in past seasons. These tests have, however, shown that it is practicable by suitable treatment to produce a palatable and marketable beverage, even although it may not bear comparison with a cider made from true vintage fruit. There has been nothing in the flavour of these ciders to constitute any serious drawback, and indeed in one instance it was so good that a really delicate dry cider was produced by suitable blending.

There appear to be two directions in which satisfactory results may be expected. The first consists in the utilisation of a moderate quantity of true vintage fruit of the sweet and bitter-sweet types to blend with the market sorts. By mixing suitable proportions of each type it is possible to obtain a juice of fair average richness in saccharine matter and of modified acidity and astringency. Such a blend can be allowed to ferment to dryness, and a very fair, dry cider may be produced. It

may even be possible in special cases to retain some natural sweetness by filtration, if the vintage sorts selected possess very slowly fermenting juices. The other course of action which may be adopted is to increase the original amount of saccharine matter in the juice by the addition of sugar in such quantity that, when completely fermented, the liquor will contain sufficient alcohol to restrain acetification. Such cider can then be stored long enough, without deterioration, for the excessive natural acidity to be gradually toned down and mellowed until it is no longer too pronounced. It may then be consumed as dry cider, or, if preferred, sweetened shortly before use with a further addition of sugar. A product of this type cannot be compared with a high-class natural cider, but it may be none the less palatable, wholesome, and saleable.

In districts where considerable quantities of apples are grown for market it is certainly worth while to devote more attention to the question of cider-making than has been given in the past, and to develop this means of profitably utilising surplus fruit. It would, however, be a mistake to regard market varieties as capable of supplanting vintage varieties for the production of the choicest types of cider.

OFFICIAL NOTICES AND CIRCULARS.

A meeting of the Advisory Council on Horse-Breeding, appointed by the President of the Board of Agriculture and Fisheries, was held on Thursday, July 6th, in a Committee-room

Advisory Council on Horse Breeding.

of the House of Lords, under the Chairmanship of Lord Middleton. Among others present were H.R.H. Prince Christian of Schleswig-Holstein, K.G., the Duke of Portland, K.G., Viscount Helmsley, M.P., Hon. Alexander Parker, Col. Hon. Charles Byng, Sir Merrik Burrell, Bart., Major-General J. F. Brocklehurst, C.V.O., Mr. Algernon Turnor, C.B., Major A. L. Langman, C.M.G., Major W. H. Fife, Capt. John Gilmour, M.P., Mr. C. C. Hurst, Mr. J. L. Nickisson, Professor Penberthy, Mr. W. Phillpotts-Williams, Mr. R. S. Tilling, and Mr. R. Whitehead.

The Board were represented by Mr. A. W. Anstruther, C.B., an Assistant Secretary; Mr. S. Stockman, Chief Veterinary Officer; Mr. J. McI. McCall, Assistant Veterinary Officer; Mr. F. W. Carter, a Superintending Inspector; and Mr. E. B. Shine; and the War Office by Major Lathom Cox.

Mr. E. B. Wilson and Mr. A. B. Charlton, Joint Secretaries to the Council, were also present.

The Chairman submitted for the information of the Council a statement as to the references made to the Standing Committee by the Board, and the recommendations made by the Committee thereon, viz. :—

London Spring Show.—That the veterinary examination under the Board's Registration Scheme during the current year and prior to entry for the show should qualify a stallion for exhibition at the show.

That exhibitors be allowed to enter as many stallions as they like in a District Class, and that they be allowed to take all premiums awarded to them.

That every King's premium stallion should "travel," and not be allowed the option of "standing" in a district.

That the method of payment for "travelling" be altered from ros. 6d. a service to an award of fifty guineas to be paid at the close of the season.

That no fee in excess of the prescribed fee be charged (unless the owner of the mare offers to pay it) for the service of half-bred mares located in the district for which the premium was awarded, unless and until seventy half-bred mares have been served, inclusive of mares purchased by a County Committee and mares in favour of which nominations for free service have been issued.

Registration of Stallions.—That the rules should contain a schedule of diseases and defects which should absolutely disqualify a stallion for registration, as follows: Cataract, ringbone, roaring, navicular disease, sidebone, shivering, whistling, bone spavin, stringhalt, and defective genital organs.

That the registration year be from November 1st to October 31st.

That the veterinary surgeon employed to examine a stallion should be required to report upon the *suitability* of the stallion for breeding purposes, as well as upon the soundness of the stallion, and be required to report fully as to any diseases or defects other than those scheduled which, in his opinion, render the stallion either unsound or unsuitable for breeding purposes.

Brood Mares.—That grants be allocated only to those counties where a Brood Mare Organisation existed, or where the necessary machinery could be put into motion without delay, and that the organisation of the scheme in such counties should be completed on a substantial basis before the scheme be extended to other counties.

On the motion of H.R.H. Prince Christian, seconded by Major-General J. F. Brocklehurst, the following resolution was unanimously adopted: "That this Council approve the recommendations made to the Board by the Standing Committee.

Mr. A. W. Anstruther, C.B., gave a summary of the operation of the Board's scheme since the last meeting of the Advisory Council. He expressed their obligations to Lord Middleton and the members of the Standing Committee for the help and advice given by them. They were also indebted to the County Committees and their secretaries, upon whose co-operation so much of the ultimate success of the scheme depended.

Considering the short notice that they were able to give in respect of the Spring Show, he considered the entries satisfactory, and he hoped the alteration of the rules referred to would conduce to more entries in the future.

The whole of the grant allotted for the purchase of brood mares had been allocated. This part of the Board's scheme had proved very popular. No difficulty had been experienced in purchasing mares and finding suitable custodians, and the mares seen by their inspectors appeared, on the whole, to have been judiciously chosen, and likely to make good brood mares.

Free nominations for service of mares by premium stallions had been well taken up, though it was hoped that in future years the ratio of soundness in the mares presented for service would be higher. The

average number of mares served by King's premium stallions was, on the whole, satisfactory, as for the first two months of the service season it was forty-three per stallion.

As regards the registration of stallions, the position was most encouraging, as with the promised co-operation of the breed societies and organisers of the principal Agricultural Shows they hoped to make the application of the scheme universal, the certificate of the Board to be accepted at all shows during the season. The number of stallions registered was 305, of which 102 were thoroughbreds.

For the mountain and moorland ponies the sum of £200 had been allocated this year with the assistance of the Polo and Riding Pony Society. It was not found possible to award premiums, but money had been distributed in prizes at selected shows in the respective districts.

Conferences would also be held with a view to elaborating a specific scheme for pony stallions and for pony mares, pack horses, &c.

He wished to impress upon those sending in schemes that he hoped, with the necessary funds, the Board would be able to carry on these subsidiary proposals side by side with the main scheme.

In response to the Chairman's invitation, various suggestions were made by members of the Advisory Council, and were referred to the Standing Committee for consideration.

Since the date of the above meeting the Board have decided to adopt and carry out the recommendations made to them by the Advisory Council.

The Board of Education issued the following circular to County Education Authorities on July 14th :—

SIR,

**Aid from the
Development Fund
for the Provision
and Maintenance of
Farm Institutes.**

1. I am to inform the Authority that the Treasury, upon the recommendation of the Development Commissioners, have decided to make an advance from the Development Fund to the Board of Education in order to enable the Board to make additional Grants in aid of the provision by County Education Authorities of Agricultural Education, in so far as that falls within the province assigned to the Board of Education by the Memorandum of Arrangements between the Board of Agriculture and Fisheries and the Board of Education, issued on the 22nd of September, 1909 (Cd. 4886 of 1909).

2. The Grants will be distributed under detailed Regulations which the Board hope to issue at an early date. They will be given, in accordance with the proposals made by the Board after consultation with representative members of County Education Authorities and in the light of the Report of the Rural Education Conference on County Staffs, and concurred in by the Development Commissioners and the Treasury, in aid of the provision by individual Counties or by combinations of Counties of County Staffs of Agricultural Instructors working from Farm Institutes as their headquarters. The several types of work within and without a Farm Institute which a County Staff might undertake in appropriate circumstances are described in detail in the enclosed Memorandum on the Principles and Methods of Rural

Education.* It is intended that a Farm Institute should serve as the headquarters for the miscellaneous and itinerant work of the Agricultural Staff, other than that done in regular local courses of instruction, and for educational demonstrations and similar purposes, and that it should also provide accommodation for central courses of instruction in agriculture and kindred subjects. These central courses might include, for example, (i) a 16 to 20 weeks' winter agricultural course for the sons of small farmers, who have acquired some practical experience on the land since leaving Elementary Schools, (ii) shorter courses in dairy work, poultry-keeping and the like during spring and summer, and (iii) vacation courses for teachers of rural subjects in local continuation courses. The buildings of an Institute should include (a) an educational block with class-rooms, laboratories for students and staff, dairy, poultry stores, carpenters' and smiths' shops, &c., and, where necessary, bee-keeping and fruit-preserving stores, (b) residential accommodation for the Principal, and (c) such other accommodation as may be desirable. Suitable equipment for the educational work will, of course, be necessary, and additional provision may in some cases be required for the institution of an Information Bureau and a Library in connection with the work of the Staff outside the Farm Institute.

3. Aid will be granted from the Development Fund towards both the provision and the maintenance of Farm Institutes. The grant in aid of the provision or enlargement of a Farm Institute will be limited to an amount not exceeding in any case 75 per cent. of the total approved cost of the provision or enlargement. The maintenance of a Farm Institute will be aided in two ways. The Authority providing the Farm Institute will receive grants under the Board's ordinary Regulations for Technical Schools, &c., in respect of the instruction given by the County Agricultural Staff in regular courses. To these will be added a contribution from the Development Fund in respect of the miscellaneous and itinerant work of the Staff, which will be so limited that the total Exchequer aid distributed by the Board shall not exceed 50 per cent. of the total approved cost of maintaining the Institute and its Staff. The small amount of aid at present given towards the miscellaneous and itinerant work of a County Staff under Article 34 of the Regulations for Technical Schools, &c., will be discontinued, and the Board's Grants, otherwise than out of the Development Fund, will in future be limited to regular courses of instruction.

4. On educational grounds the Board of Education regard it as essential for the successful working of a Farm Institute that there should be available and in close proximity to it a farm and garden. These will not only be required in connection with the internal courses of the Institute, but should also serve as an object-lesson to the farmers and gardeners of the country. In some cases a "small holding" for demonstration purposes may with advantage be added. The farm and garden should be conducted on business principles, so far as may be consistent with their primary use for educational purposes; but it is probable that such use will as a rule entail some annual deficiency upon a profit and loss account. Under the Memorandum of Arrangements

* To be obtained from Messrs. Wyman & Sons, Fetter Lane, E.C. Price, 3d.

between the two Boards it will be for the Board of Agriculture and Fisheries to distribute any State aid which may become available for the purposes of a farm and farm buildings. That Board will, it is understood, in fact seek an advance from the Development Fund for the purpose of enabling them to aid Local Education Authorities to equip and maintain farms in connection with Farm Institutes.

5. It will as a rule be desirable that the value of a Staff of Agricultural instructors should be fully recognised in a County before it is given permanent establishment in an Institute, and the Regulations will, therefore, make temporary provision for grants towards the maintenance of a Staff of Instructors, which has been appointed in advance of the provision of its permanent headquarters, as an initial step in the more complete organisation proposed for a County or a group of Counties.

6. The sums which will be advanced to the Board of Education up to March 31st, 1916, from the Development Fund for the purposes explained above will not exceed in all £325,000. It is understood that the Development Commission are not prepared to recommend the making of any other advances during this period for the purpose of aiding the provision of such branches of Agricultural education as fall within the province of the Board of Education. In these circumstances Local Education Authorities will doubtless recognise that no useful purpose will now be served by their undertaking the preparation of applications to the Treasury for direct advances from the Development Fund, and will instead make application to the Board of Education for aid towards Farm Institutes under the forthcoming Regulations.

7. In making grants under this scheme to Local Education Authorities, the Board of Education have undertaken to secure that the grants shall not have the effect of reducing the amount of any expenditure at present incurred by the Local Education Authority out of rates or other local resources upon work of the type to be aided, or the amount of any contribution made by the Authority out of such funds to the higher types of educational work conducted by Agricultural Colleges. It is also essential that only such Farm Institutes shall be provided and maintained by aid from the Development Fund as are really necessary, and in this connection the Board will give close consideration to the possibility and desirability of combination between Counties for the purpose. In view of the limitations placed upon the funds at the Board's disposal, it may be necessary to impose limitations upon the number and size of the Institutes to be aided in any individual County.

8. The detailed Regulations will be supplied to the Authority as soon as they can be prepared. Many points of detail in regard both to the substance and form of applications will require settlement and will need careful consideration, and the Authority should therefore defer for the present the completion of any scheme they may have it in contemplation to make, either alone or in conjunction with other Counties, as it will be impossible for the Board to deal with any applications relating to Farm Institutes or County Agricultural Staffs until the Regulations have been published.

I am, Sir,

Your obedient Servant,

E. K. CHAMBERS.

The Board of Agriculture and Fisheries have received from the Development Commissioners the following statement respecting applications for advances from the Development Fund for the establishment of motor services in rural districts :—

**Applications for
Advances from the
Development Fund
for Motor Services
in Rural Districts.**

The attention of the Development Commissioners has recently been called to the question of assisting, by advances from the Development Fund, the establishment of motor services in rural districts.

They have adopted the following as conditions with which they think that all schemes for that purpose should comply before they can be recommended to the Treasury :—

(1) Application should be made only for an advance towards the initial capital expenditure necessary.

(2) The application should be for an advance by way of loan rather than by way of grant; rates of interest and terms of repayment will be fixed according to the circumstances of each case.

(3) A local contribution should be forthcoming of a reasonable proportion of the capital sum required.

(4) It should be shown that full provision is or will be made for putting in order (where necessary), and for maintaining the roads on which the service is to run.

(5) Proper provision should be made for maintaining the service, without recourse to the Development Fund.

A Conference, arranged by the President of the Board of Agriculture and Fisheries between delegates from the Berkshire and Adjoining Counties Dairy Farmers' Association and representatives of the Great Western Railway Company, took place at Reading on July 3rd with reference to the railway facilities afforded for the milk traffic in the area embraced by the Association.

**Carriage of Milk
by Rail.**

Mr. J. Cornelius, of the Board of Agriculture and Fisheries, presided, and the following gentlemen were present: Mr. W. A. Mount, M.P., Mr. J. Lousley, Mr. T. Latham, Mr. F. Habgood, Mr. R. C. Nisbet, Mr. W. G. Clift, Mr. W. Farrant, Mr. A. E. Scutt, Mr. R. Pyke, and others, representing the Association; and Mr. J. Dunster, Mr. J. V. Williams, and Mr. H. J. Rule representing the railway company.

After discussion, the railway representatives promised that several of the questions raised by the Association should receive consideration.

No further outbreaks of Foot-and-Mouth Disease have been reported in Middlesex. The Board have caused very close inquiry to be made

**Foot-and-Mouth
Disease in
Middlesex and Sussex.**

as to the origin of this outbreak, but have obtained no evidence throwing any light on the subject. The Board have made Orders withdrawing, as from the 8th inst., all the restrictions imposed by them on the movement of animals in connection with these outbreaks.

On the 17th July the Board received a report of suspected Foot-and-

Mouth Disease in cows and calves at Road End Farm, Udimore, near Winchelsea, Sussex, and on the 18th disease was found on The Hammond's Farm, five sheep being affected, and also among some sheep at Float Farm, both being in the vicinity of the first-named outbreak. The existence of the disease was confirmed in each case, and the Board ordered the slaughter of the whole of the stock of these three farms, viz., 86 cattle, 2,300 sheep and lambs, and four swine; while as a matter of precaution 160 sheep which had been exposed to infection were also slaughtered. A large number of sheep outside the infected places were examined, but no evidence of disease was found.

The Board have made an Order, which came into operation on the 10th inst., modifying the restrictions in connection with these outbreaks. Restrictions will, from the date of the operation of the new Order, be in force only within a zone of approximately six miles of Udimore. No part of Kent is included in the Order.

MISCELLANEOUS NOTES.

Importation of Potatoes into the Commonwealth of Australia.—By a Proclamation dated March 17th, 1911, under the Quarantine Act, 1908,

Importation Regulations.

the importation of potatoes from any country into the Commonwealth is prohibited unless:—

1. They are accompanied by an official certificate, dated and signed by a responsible officer of a Government Department of the country of origin, identifying the potatoes, specifying the quantity, and certifying—

(a) That at the date of the issue of the certificate they were free from the disease caused by *Phytophthora infestans* (known as Irish Blight), and from the disease *Chrysophlyctis endobiotica* (known as potato canker, black scab, warty disease, and cauliflower disease in potatoes);

(b) That they were grown in the country named;

(c) That they were grown at least twenty miles from any place known, after due investigation, to be or to have been within five years infected with either of the said diseases;

(d) That they were packed in the country of origin in clean, new packages.

2. The bags, crates, or other packages containing the potatoes are marked on the outside with the name of the country of origin and with other distinguishing mark or marks.

Sections 3 and 4 deal with the conditions to be fulfilled by the consignee on arrival of the potatoes in Australia, and provide for their being planted and cultivated in quarantine.

The above restrictions are relaxed in respect of potatoes imported for food.

Importation of Live Stock into South Africa.—The Diseases of Stock Act, 1911, of the Union of South Africa, repeals various laws of the several States of the Union and substitutes certain provisions, of which the following is a summary as regards the importation of animals into the Union from oversea countries.

Before any animals can be imported a written permit must be

obtained from the principal veterinary officer. The latter, before granting the permit, must be satisfied that the country of origin is free from diseases to which the stock in question is liable, or, if not, that his requirements have been complied with; or, in the case of stock from any part of Africa outside the Union, that the stock itself is free from disease.

Imported animals are to be subject to isolation for at least thirty days. Cattle are subject to the tuberculin test, and animals reacting will be destroyed without compensation. Where any disease other than tuberculosis is suspected, such tests may be made as are prescribed by the regulations for the particular species of stock.

The veterinary officer at the port of entry may order the stock to be inoculated, dipped, disinfected, sprayed, branded, and muzzled or otherwise secured before the permit of the principal veterinary officer is issued. The expenses of such treatment, together with the cost of maintenance of the animals during isolation, must be borne by the owner. Stock which is infected or suspected of being infected, or which has been in contact with infected or suspected stock, may be destroyed, re-exported, or kept under such conditions as the principal veterinary officer may determine, the method adopted being left to the choice of the owner if this is made within seven days.

Inspection of Imported Potatoes in South Africa.—The South African Union Department of Agriculture has issued the following particulars as to the inspection of potatoes:—

Importers of seed and table potatoes and all others interested are requested to note that the Union Department of Agriculture has decided to inspect all potatoes introduced into the Union of South Africa from overseas at the port of entry. Inspectors will be stationed at Cape Town, Port Elizabeth, East London, and Durban, and every box or bag, as the case may be, will be opened and the contents examined. All rotting, diseased, fungus-infected, scabby, or insect- or worm-infested potatoes will be removed, and destroyed by fire without compensation to the owner.

Any lot of potatoes found to be infected with Black Scab or Warty Disease (*Synchytrium endobioticum* Percival) will be rejected entirely, and any lot found to be infected with a bacterial disease deemed to attack sound tubers will also be rejected if the infected potatoes are judged to constitute 5 per cent. or more of the consignment. Lots judged to be infected with such a bacterial disease to a less extent than 5 per cent. will probably be admitted for consumption, but not for sale as seed.

No consignment will be passed for admittance into the country unless (1) the consignee surrenders to the examining officer a declaration from the consignor showing the country and local place of origin of the potatoes, giving data that establish the identity of the consignment, and declaring that to his best knowledge and belief the fungous disease known as Black Scab or Warty Disease (*Synchytrium endobioticum* Percival) has never been known to occur on the farm or farms where the potatoes concerned were produced; and (2) unless the consignee, if called upon to do so by the examining officer, produces an official certificate from the Government Department of Agriculture of the country of origin in which it is certified at a date not more than

nine months previously that the department, shire, county, or other such territorial division in which are situated the place or places declared as being the source or sources where the potatoes were produced are deemed by the Government to be entirely free from the said disease. The examining officer may require that an attested copy of the Government certificate be surrendered to him with respect to any or all consignments. A certificate with respect to any place will be considered invalidated if the disease is recorded to be present there in a later-issued certificate or in an authoritative report. The official certificate required may be made as an endorsement on the consignor's declaration.

A minimum fee of $2\frac{1}{2}d.$ per case or bag will be charged for sorting, and a further charge of $\frac{1}{2}d.$ per case or bag will be made for every 1 per cent. or fraction of 1 per cent. of potatoes which it is found necessary to remove. Thus, if three cases in a hundred cases, or if four to five cases are condemned, the fee will be at the rate of $5d.$ per case.

Importers and others interested can obtain copies of the regulations when issued on application to the Acting Secretary for Agriculture, Pretoria, or the High Commissioner for the Union of South Africa, London. It is expected that the regulations will be in force in time to admit of their application to the first consignments of potatoes which will arrive from Europe in the present season.

Importation of Dogs into the Straits Settlements.—The *Federated Malay States Government Gazette*, of 26th May last, contains certain rules which have been published for general information relating to the importation of dogs into the Straits Settlements.

Under these rules, which amend the Quarantine Rules of 1908, it is provided that no person shall bring any dog into any Settlement either from another Settlement or from a place outside the Colony, unless a permit is first obtained from the veterinary officer of the Settlement into which the dog is to be brought, or from such officer as may be empowered to issue such permit.

In granting such permit, the veterinary officer may, in his discretion, impose such conditions as to observations as may be considered necessary, and may require the dog on landing to be detained in quarantine for a period not exceeding three months.—(*Board of Trade Journal*, July 13, 1911.)

Barley and Hop Exhibition at Chicago.—The second International Brewers' Congress and an International Barley and Hop Prize Exhibition will be held at Chicago from October 12th to 22nd next. The first Congress was held in connection with the Brussels Exhibition in 1910. The Congress will be divided into six sections for the discussion of the following questions connected with brewing: (1) Science of brewing (chemistry and biology); (2) Agriculture (barley and other cereals, and hops); (3) Practice of brewing and malting; (4) Materials (cereals, raw and prepared, and miscellaneous); (5) Engineering, refrigeration and fuel; (6) Economics (legislative, dietetic, and social). There will be an American exhibition of brewing machinery, materials, and products, and in connection with this the International Competitive Prize Exhibit of Barley and Hops; exhibits of agricultural experiment

stations demonstrating results in the cultivation of pedigree barleys and hops; educational exhibits, comprising collective exhibits of barley and hops for countries, states, or sections; brewing materials; scientific exhibits, comprising laboratory instruments and equipment, biological cultures, drawings, analytical methods, &c.

A subscription of \$5 (£1 os. 10d.) entitles to membership in the Congress and a report of the proceedings. This should be received by August 31st by the Secretary-General, 1508 Republic Building, Chicago.

The Congress will welcome delegates from the scientific institutions and trade organisations interested, and the sending of exhibits by such institutions and by growers of products that are suitable for the exhibition, as well as the attendance of individuals interested in the industry. Copies of the invitation to and rules of the Congress and the rules and regulations for the Barley and Hop Prize Exhibition can be seen at the Board's office.

International Congress and Exhibition of Apiculture.—H.M. Consul at Turin (Mr. J. H. Towsey) reports that an International Congress of Apiculture is to be held at Turin, under the patronage of the Italian Government, from 10th to 12th September. In connection with the Congress an International Exhibition of Apiculture will be held from 10th to 20th September. Applications for space should be sent to the offices of the Executive Committee of the Exhibition, 2 rue Po, Turin.

Copies of the programme of the Congress and Exhibition may be seen at the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, London, E.C., where also a few copies are available for distribution.—(*Board of Trade Journal*, July 13, 1911.)

During the *first* week, July 2-8, the weather was very fine over the whole of England, and little or no rain fell. In Scotland there was rain

<p>Notes on the Weather in July.</p>	<p>on several days, but by the end of the week the fine weather had extended there also. Warmth was "unusual," rainfall "light" or "very light," and sunshine "abundant" or "very abundant" almost everywhere.</p>
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In the *second* week the weather was very fine and dry generally, no rain being experienced except some slight falls in the north and west at the end of the week. Sunshine was "very abundant" in every district of Great Britain, and rain "very light" or "nought." Warmth was "unusual" everywhere except in England N.E. and E., where it was "moderate."

During the *third* week the conditions were still very fine over the greater part of England, but a little rain fell at times in the north-western and north-eastern counties and in North Wales. The warmth kept up, but sunshine was rather less than in the week before, and below the average in Scotland and the north-west and north-east of England.

During the *fourth* week the weather in England, although mostly fair to bright, was more variable than during the preceding week, while in Scotland the general condition was unsettled and rain frequent. A violent thunder storm occurred in parts of southern England, and others over the country generally.

**Crop Conditions
in Great Britain
on August 1st.**

The Reports furnished by the Crop Reporters of the Board on the agricultural conditions on the 1st August, especially refer to the effect upon the crops and live stock of the prolonged period of drought and heat. With the exception of wheat, of which the prospects have improved to an extent indicated by 2 per cent. on the probable yield, and of hops, which on the whole appear to have maintained their position, all crops have more or less deteriorated. The superiority of wheat over the other corn crops has increased during the month, and while in yield it will be the "crop of the year," reports as to its quality are also satisfactory. With the exception of North Wales and the West Midland division of England an average or over average yield may be expected in each division, with a result for the whole of the country of a crop some 3 per cent. above the average of the past ten years. Both barley and oats have suffered from the drought, the latter, in particular, being frequently described as thin and patchy. Both crops have ripened prematurely, and the grain is light. In none of the divisions of the country is the yield of barley expected to reach an average; while the results for oats are still less promising, the yield for the country as a whole being forecasted at 8 per cent. below average. All three cereals are short in the straw, and the harvesting of each is in progress throughout the country. Beans are also short in the haulm and have suffered considerably from attacks of "fly" as well as from the drought. They are now expected to be as much below the average as oats. Peas also have suffered from the lack of rain, and in some districts are reported to have dried up. The yield, which on the 1st of July was regarded as about average, is now anticipated to be 5 per cent. below it.

Potatoes are generally described as being in a healthy condition with a good growth, and marked freedom from disease. Reports show that early varieties have been lifting lightly, and the lack of rain will tend to diminish the weight of the main crop. In Wales and Scotland the yield promises to exceed the average, but in England an under average yield is predicted, and for the country, as a whole, the result will be about an average.

Roots have suffered from the long spell of dry weather, though mangolds have been less affected than turnips and swedes. Mangolds have made little progress and are generally backward, and the yield for all divisions of England and Wales is expected to be below the average. Turnips and swedes are frequently described as a poor plant, and backward, and are much in need of rain. In Scotland the early sown pieces are progressing more satisfactorily than the later sown.

The hay crop was secured in good condition, very quickly, and with little labour, the weather being for the most part favourable. The yields both for "seeds" hay and meadow hay are lighter than were anticipated a month ago. Both crops are now put slightly lower than a month ago, and the total supply will be considerably below average.

Reports on hops in the south-eastern division state that the bine is slack owing to the drought, and rain is needed. Vermin is not now generally prevalent, but the yield is not likely to reach an average. In the West Midland division reports are variable, and an average yield may be obtained, but for the country as a whole the crop is not expected to come up to an average.

All classes of fruit, and particularly orchard fruit, have suffered from the drought, which has caused a large proportion of apples, pears, plums, and cherries to fall from the trees. Strawberries were about an average crop, while the remaining crops both of small fruit and tree fruit are considerably under average.

Pastures have been very much burnt up by the heat, the scarcity of grass necessitating resort to oil cake and other feeding stuffs. Water has been very scarce in some districts, and stock have suffered in consequence. Where the water supply has been maintained stock have done fairly well, and crop reporters frequently express surprise that the condition of the herds and flocks has been so well kept up under such trying circumstances. There are frequent references to the reduced supply of milk, the result of which has been apparent in the Weekly Return of Market Prices. Summarising the reports and representing an average crop by 100, the appearance of the crops on the 1st August indicates yields for Great Britain which may be represented by the following percentages:—Wheat, 103; barley, 96; oats, 92; beans, 92; peas, 95; potatoes, 100; mangold, 97; "seeds" hay, 93; meadow hay, 89; hops, 98.

The *Bulletin of Agricultural Statistics* for July, 1911, issued by the International Institute of Agriculture, gives the following forecast of the present cereal harvest from information received in time for publication on the 22nd

**Notes on Crop
Prospects Abroad. July:—**

Single Numerical Statement of the Production of the more important Cereal Crops in the Northern Hemisphere.—The area which has been harvested, or which is about to be harvested, of the four most important cereal crops—wheat, rye, barley, and oats—is now known for a number of countries in the Northern Hemisphere, and we are also able to give an approximate estimate of the probable production. Uniting these data in a common table and comparing them with last year's figures, we have the following results:—

Wheat.—The area has increased from 97,483,400 acres to 100,778,100 acres. The single numerical statement of the area, *i.e.*, the ratio, in percentage figures, between this year's area and the area last year, is 103'4.

The production has increased from 188,100,100 qrs. to 198,166,870 qrs. The single numerical statement of the production, *i.e.*, the ratio, in percentage figures, between this year's production and the production last year, is 105'4.

Rye.—The area has decreased from 6,585,960 acres to 6,559,800 acres. The single numerical statement of the area is 99'6.

The production has increased from 15,059,900 qrs. to 15,526,500 qrs. The single numerical statement of the production is 103'1.

Barley.—The area has increased from 9,674,100 acres to 9,863,300 acres. The single numerical statement of the area is 102'0.

The production has increased from 31,719,773 qrs. to 34,161,700 qrs. The single numerical statement of the production is 107'7.

Oats.—The area has increased from 7,382,900 acres to 7,409,600 acres. The single numerical statement of the area is 100'4.

The production has increased from 31,549,100 qrs. to 32,161,300 qrs. The single numerical statement of the production is 101'9.

In order to obtain an exact interpretation of these data, it should be borne in mind that—

The figures are only approximate. As revised figures are received at the Institute, these will always be included in the tables of the following month.

The figures for India and Tunis are the same as those published in the June *Bulletin*, no revisions having been received.

The figures of production for the other countries have come to hand during the past few days. With the exception of those for Belgium, Roumania and Denmark, the data have been furnished in absolute figures. The first two of these countries have supplied the figures of yield per acre, while Denmark has given the production in a percentage of the average production for the past ten years. In these three cases, therefore, the yield per acre and the percentage figures have been reduced to absolute figures.

Bulletin of Agricultural Statistics, Supplement, July, 1911.—This supplement contains revised figures for the estimated production of wheat in Italy and Roumania, and an estimate of the spring wheat crop in the United States. Taking these into account the total estimated production of spring and winter wheat in the following countries: Belgium, Denmark, Spain, Great Britain, Hungary including Croatia and Slavonia, Italy, Luxemburg, Roumania, Switzerland, United States, British India, Japan, and Tunis, amounts to 226,288,000 qrs., as compared with 216,964,356 qrs. last year.

The single numerical standard, *i.e.*, the ratio, in percentage figures, between the estimated production this year and the production obtained last year thus becomes 104'3, in place of the figure previously obtained and quoted on p. 434.

France.—The report of the Ministry of Agriculture on the state of the crops on July 1st gives the condition of winter wheat as good in thirty-five departments, and satisfactory in forty-eight departments. Spring wheat was good in twenty-five departments, satisfactory in thirty-six, moderate in one, and poor in one. In the case of the remaining departments, four for winter wheat and twenty-four for spring wheat, there was no information or the crop was not grown.—(*Journal Officiel*, July 21st, 1911.)

Hungary.—According to the report issued by the Hungarian Minister of Agriculture, dated July 25th, the estimated crop yields are as follows:—Wheat, 22,220,000 qrs.; rye, 5,980,000 qrs.; barley, 8,690,000 qrs.; oats, 9,340,000 qrs. The maize crop has suffered considerably, its growth having been arrested by the prolonged heat. These figures are slightly greater than the estimate of July 11th.—(*Dornbusch*, July 31st, 1911.)

Roumania.—The British Consul at Bucharest, Mr. Errol MacDonell, in a dispatch, gives some information on the state of the local crops collected from an official publication dated the 30th June. Owing to the rains that fell at short intervals and the warm weather, all crops grew rapidly, and at the time of the report were in good condition.

It was feared, however, that the quality might suffer owing to the great heat subsequently. Autumn wheat, rye, and oats ripened in the last half of June. In the plains and towards the sea the crops were in good condition, with large ears full of heavy grain. Notwithstanding a small amount of damage caused by rain, wind, and some hail, a fine crop of wheat and barley is to be expected. The oat crop also was expected to give a very large production.

Maize was sown in the first decade of June in some districts, and owing to rain and cool weather growth was good, especially where the rain was plentiful. The second hoeing was nearly finished at the end of June, and in some districts the cob had already formed.

World's Hop Crop.—In their report, dated the 10th July, on the hop season 1910-11, Messrs. Barth & Son, of Nuremberg, state that the area under hops in the world in 1910 was 233,544 acres, against 240,634 acres in 1909, but that the production per acre was large; in fact, the firm regard it as one of the largest of the past thirty years. The quality of the crop suffered considerably from the cold wet weather during harvest time, and the drying of the hops was at times much impeded. Prices in Germany were very low at the beginning of the season, and have fluctuated considerably, but generally they have gradually advanced, until at present they are at their highest point. There is a great scarcity of stocks at the present time, and only a world's record crop will satisfy the demand. The 1911 plant has wintered well in all countries, and the general prospect is fairly good.

Russia.—A report in the official *Commercial and Industrial Gazette* of July 26th, forwarded by the British Commercial Attaché at St. Petersburg, sums up the prospects of the grain crops in Russia as follows:—In general, according to information received from all the sixty-three Bourse Committees, the grain crop in European and Asiatic Russia this year is an average one, considerably less than that of last year. The prospects are satisfactory for all grains in the west, south-west, and the south, and in places, especially in the governments of Ekaterinoslav, the Tavride, Kharkoff, and Kieff, very satisfactory. In the centre of the Empire the outlook is somewhat worse, though inclining towards an average yield. In the central and lower Volga, in the basins of the Kama and Bielaia, as also in the Ural region, it is already clear that the crop will be below the average, and in places even bad. In Siberia, with the exception of the government of Irkutsk, the Altai districts of the Tomsk government, and some separate districts of a few other governments, there is a complete failure of the grain and fodder crops. The reserves of grain this year are everywhere limited, and are considerably smaller than last year's.

United States.—The Crop Reporting Board of the United States Department of Agriculture estimates the yield of winter wheat at 455,000,000 bushels, as compared with a final estimate of 464,000,000 bushels last year. The average quality of the crop is put at 92.2, against 92.6 last year. The average condition of spring wheat on August 1st was 59.8, against 73.8 last month, 61.0 on August 1st, 1910, and 82.3 the ten-year average on August 1st. The average condition of the oat crop on August 1st was 65.7, against 68.8 last month, 81.5 on August 1st, 1910, and a ten-year average of 82.2. The average condition of barley on August 1st was 66.2, as compared with 72.1 last month,

70.0 on August 1st, 1910, and a ten-year average of 85.1.—(*Dornbusch*, August 9th, 1911.)

The Department of Agriculture has informed the International Institute that the estimated production of spring wheat in 1911 is equal to 105.8 per cent. of that of 1910. On this basis the Institute has calculated the probable production this year to be 244,751,000 bushels, compared with 231,334,000 bushels last year, and the production of all wheat 702,580,000 bushels, compared with 695,247,000 bushels last year.—(*Bulletin of Agricultural Statistics*, Supplement, August 1, 1911.)

Germany.—The German Imperial Statistical Bureau estimates the condition of the crops on August 1st as follows:—Winter wheat, 2.6; spring wheat, 3.0; winter rye, 2.6; spring rye, 2.7; barley, 2.5; oats, 2.9; potatoes, 3.0 (2=good, 3=average).

Canada.—*The Census and Statistics Monthly* for the month ended June 30th states that the condition of the field crops was then on the whole quite satisfactory. The condition of the crop, compared with the average yield in the last three years is as follows (100=average for 1908-10):—Winter wheat, 89; spring wheat, 112; barley, 107; oats, 107.

Prevalence of Animal Diseases on the Continent.

The following statement shows that, according to the information in the possession of the Board on August 1st, 1911, certain diseases of animals existed in the countries specified:—

Austria (week ending July 12th).

Anthrax, Blackleg, Swine-fever, Foot-and-Mouth Disease (7,952 Höfe), Glanders and Farcy.

Belgium (fifteen days ending June 15th).

Anthrax, Blackleg, Rabies, Foot-and-Mouth Disease (1,464 "foyers" in 289 "communes").

Bulgaria (week ending July 14th).

Anthrax, Glanders and Farcy, Rabies, Sheep-scab, Swine-fever, Swine Erysipelas, Foot-and-Mouth Disease.

Denmark (month of June).

Anthrax, Swine Erysipelas.

France (month of June).

Anthrax, Blackleg, Glanders and Farcy, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Swine-fever.

Foot-and-Mouth Disease (3,958 "étables" in 944 "communes").

Germany (on June 30th).

Glanders and Farcy, Swine-fever, Foot-and-Mouth Disease (20,793 infected places in 3,737 parishes).

Holland (month of June).

Anthrax, Foot-rot, Swine Erysipelas, Foot-and-Mouth Disease (18,241 outbreaks in 10 provinces).

Hungary (on July 5th).

Anthrax, Rabies, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (7,480 "cours").

Italy (week ending June 12th).

Anthrax, Glanders and Farcy, Rabies, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (1,549 cases entailing 29,540 animals).

Montenegro (sixteen days ending April 15th).

Foot-and-Mouth Disease (54 "étables" infected in 11 "communes").

Norway (month of June).

Anthrax, Blackleg.

Roumania (nine days ending July 13th).

Anthrax, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Swine-fever.

Russia (month of March).

Anthrax, Cattle-plague, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (77,126 cases in 1,350 "communes").

Servia (eight days ending July 15th).

Anthrax, Rabies, Sheep-pox, Swine-fever, Foot-and-Mouth Disease (139 cases in 4 "arrondissements").

Spain (month of April).

Anthrax, Blackleg, Dourine, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas.

Sweden (month of June).

Anthrax, Blackleg, Swine-fever.

Switzerland (week ending July 23rd).

Anthrax, Blackleg, Swine Erysipelas, Foot-and-Mouth Disease (232 "étables" and 180 "alpages-pâturages" entailing 17,879 animals, of which 63 "étables" and 36 "alpages-pâturages" were declared during the week).

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in July:—

**Agricultural Labour
in England
during July.**

Fine weather prevailed throughout July, and agricultural employment was consequently uninterrupted. Some day labourers, however, were short of work in the early part of the month, as the absence of rain checked the growth of the root crops and diminished the amount of hoeing to be done. The corn harvest began in several counties before the end of the month, and the crop stood up well, permitting the use of machinery wherever available. The supply of day labourers was usually sufficient for requirements.

Northern Counties.—The continuous dry weather somewhat hindered hoeing at the beginning of July owing to the backward state of the root crop, but there was a brisk demand for extra labour for hay-making. The supply of day labourers was, however, in general quite sufficient.

Midland Counties.—Haymaking commenced early; the crop, however, was rather light, and being also in good condition, hand labour was reduced to a minimum. In several districts the corn harvest followed on before the end of the month. There was a fair demand for day labourers, which was, however, generally fully met by the supply. Some scarcity of men for permanent situations was reported in the Bucklow

(*Cheshire*), Barrow (*Leicestershire*), and Pershore (*Worcestershire*) rural districts.

Eastern Counties.—Employment was regular throughout the month. Day labourers were generally in good demand for hoeing roots and haymaking, although in some districts the supply was somewhat in excess of requirements.

Southern and South-Western Counties.—Owing to the dry weather the growth of weeds was checked, and consequently the root crops did not require so much hoeing as usual. The hay crop being light and easily cut, there was no great demand for extra labour, the supply in most cases being quite sufficient. Some scarcity of day labourers was, however, reported from the Wantage (*Berks*), Wells (*Somerset*), and West Penwith (*Cornwall*) rural districts. Men for permanent situations were in demand in the Chippenham and Devizes (*Wilts*), Dursley (*Glos.*), and Liskeard (*Cornwall*) rural districts.

THE CORN MARKETS IN JULY.

C. KAINS-JACKSON.

During the season just before harvest the weather is the leading influence, but it is seldom that all other influences are so completely eclipsed as they have been for the past thirty-one days. The forcing heat had brought the prospective date of new crop deliveries well forward by the end of the month, and thereby checked advancing tendencies; but the general opinion that production, while of over-average quality, would be lacking in bulk and quantity except in the case of wheat, made itself felt, and holders of grain at Lammas were confident of values both for old crops and new.

Wheat.—The statute markets during July seldom included a 33s. average from any leading centre for British wheat, while an average below 30s. was even more rare. Value, therefore, was unusually level for the old crop towards the close of the season. New wheat was offered at Mark Lane on the 31st, and 33s. to 34s. per 504 lb. was about the price; 1s. to 1s. 6d. above this would have been paid if the grower could have promised delivery before the Bank Holiday. At Norwich on the 29th rubbed-out samples were shown, and a price of 32s. for delivery to local mills on or before August 12th was obtained. The majority of farms, however, declined to "sell forward," and the tone of trade was quite firm. Prices ruling at the close of the month for imported produce were about as follows, the mean values on July 31st, 1910, being given, for the sake of comparison, in brackets. Best Russian, 36s. 6d. per 496 lb. (40s.); No. 1 Northern Manitoba, none (43s. 9d.); No. 2, 37s. 9d. per 480 lb. (43s.); Australian, 36s. per 480 lb. (40s.); Argentine, 35s. per 480 lb. (none); No. 2 White Calcutta, 34s. 9d. per 496 lb. (38s. 6d.), and Red Karachi, 33s. 9d. per 496 lb. (37s. 0d.). Durum was in fair supply a year ago at 37s. to 38s. per 480 lb., but is not now on offer.

Sales of British wheat for eleven months of the cereal year have been smaller than anticipated, but an unusually large quantity is believed to have been used on the farm, largely for poultry purposes. Imports for the eleven months have been decidedly less than last season. The

shipping year ends July 31st. Returns of breadstuffs' exports (including flour as wheat) are not yet fully verified, but will probably show record totals, about 74 million quarters against $62\frac{1}{2}$ millions last season. Russia and Europe S.E. have led the wheat export trade. Shipments of the month were 557,000 qrs. from North America, 789,000 qrs. from South America, 1,326,000 qrs. from India, 2,176,000 qrs. from Russia, 254,000 qrs. from Europe S.E., and 544,000 qrs. from Australia. The large Indian shipments were noticeable. The supply on passage on 31st was 2,910,000 qrs., a very ordinary total.

Flour.—Holders of flour have had a very unfavourable month. The weather has been against the condition of supplies in warehouse, and at the same time has been adverse to a good inquiry for bread. Thus bakers were buying less than usual in the identical weeks when millers had strongest reasons for effecting a clearance. That prices show little change, nothing, indeed, worth quoting, must be ascribed to the sustaining influence of the firm market for all sorts of wheat. The shipments of July were 395,000 sacks from North America and 15,000 sacks from Australia, both under-average quantities. The supply on passage on the 31st was 133,000 sacks—a very small total.

Barley.—The month closed with 380,000 qrs. on passage, including 145,000 qrs. Russian feeding, and 70,000 qrs. Californian brewing. Trade has been very inert, but the chief imported kinds have remained in strong hands. The shipping year witnessed specially large exports of this cereal from Russia and Roumania, and fair exports from California. The shipments of the month were 1,868,000 qrs. of feeding corn from Russia, and 147,000 qrs. from Europe S.E.

Oats.—The supply on passage remains considerable, but the hot weather is regarded as having been very exhausting for the growing crop, and holders have shown no haste to sell. Both Argentine and Russian cargoes on passage have, indeed, been held for an advance. On the 31st new winter oats at Mark Lane made 19s. to 19s. 6d. per qr. During the shipping year ended July 31st, Russia exported the colossal total of eleven million quarters, which exceeds by a million the world's shipment of oats for the year ended July 31st, 1909. For that year ended July 31st, 1910, the total exports of all countries were $12\frac{1}{2}$ millions. The shipments of the month were 212,000 qrs. from North America, 132,000 qrs. from South America, 867,000 qrs. from Russia, and 40,000 qrs. from Europe S.E.

Maize.—The month witnessed a remarkable development of market strength for this cereal, and the strength was further to be noted for its statistical and non-speculative basis. While imports, over six millions for the first seven months of 1911, are considerable, use has been large and stocks are less than usual. Meanwhile, the bids of 24s. to 26s. from Mark Lane per qr., and of 5s. 5d. to 5s. 7d. from Liverpool per cental, have quite failed to attract foreign holders, so that by the 31st the supply on passage to the United Kingdom had fallen to 380,000 qrs. against 865,000 qrs. on July 31st, 1910, and 955,000 qrs. on July 31st, 1909. As compared with a twelvemonth ago, Argentine was 1s. 6d. and African 2s. dearer, but American could be had for 26s. where a year back it was not on spot offer at all, and the chief round sorts at 25s. to 26s. were not dearer on the twelvemonth. The growing maize was regarded on the 31st as promising in S.E. Europe. Argentina did

not ship any yellow corn in the course of the month. The shipments of the month included 385,000 qrs. of flat corn from North America, very much below the quantity anticipated, 1,333,000 qrs. of round corn from Russia, and 1,313,000 qrs. of round corn from Europe S.E., both these latter items greatly exceeding expectation.

Oilseeds and Oilcake.—All sorts of oilcake are cheaper as compared with this time last year, and cottonseed cake has lately been attracting a larger sale than is usual for the season. Linseed and cottonseed remain dear without the quotations being anything very striking. Very little linseed is to be had under 70s. per qr. India has a good surplus of rapeseed, which is being very steadily exported, though the United Kingdom is, as usual, but a small buyer. Egyptian exports of cottonseed for eleven months of the cereal year are about 430,000 tons. Hull has bought more freely than any other port. Total shipments of linseed from all countries, January 1st–July 31st, were 3,200,000 qrs., against 3,801,000 qrs. last season, and 5,079,000 qrs. in the season before. July shipments of linseed were 127,000 qrs. from Argentina, 326,000 qrs. from India, and 50,000 qrs. from Russia. There were also small shipments from Morocco, Holland, and Turkey. The quantity of linseed on passage on 31st, 203,000 qrs., was a full average, but did not exceed it.

Various.—A month of great excitement has marked the trade in beet sugar. Crop reports week after week deepened in gravity from all the great producing regions, and at one time 13s. 6d. per cwt. (4s. 6d. above January) was obtainable. Opinion is not now quite so pessimistic, but a monthly review can indicate no precise values where a staple is fluctuating daily. Rice has been a strong market for the raw product, and the advance of 10s. to 15s. per ton in the by-products of the mill has caused increased sales, at 5s. per ton rise, of ricemeal and ricebran. Soy bean cake is a small supply and also a small inquiry just now. The market for soy beans has been dull, and prices favour buyers. Of soy beans there were on passage on July 31st about 52,000 tons. A large shipping trade was done in rye, August 1st–July 31st, over 5,200,000 qrs. being exported (mainly by Russia), against 2,600,000 qrs. in the previous shipping year. Very little has come to our shores, but the exceptional business is worth recording.

THE LIVE AND DEAD MEAT TRADE IN JULY.

A. T. MATTHEWS.

Fat Cattle.—The break in the long drought that occurred in June was only temporary, and the absence of rain and the great heat have added greatly to the graziers' troubles during July. Stores, purchased at very high prices, have had to be sold at very little more than cost. In seasons like the present, when the pastures are burnt up, it is inevitable that market prices must suffer from the number of immature animals sent forward to relieve the pressure on the food resources of the farm. Continued heat also diminishes the consumptive demand for flesh foods, and, with these influences at work, it is not surprising that the average prices of fat cattle to-day should be less by just about 1s. per stone than they were a year ago.

The average prices for July are, however, no worse than those for June, and in the case of Herefords and Scots they were slightly better. They were as follows:—Shorthorns, 8s. 0½d., 7s. 4½d., and 6s. 4d., against 8s. 0½d., 7s. 4½d., and 6s. 4d. per stone in June; Herefords, 8s. 3½d. and 7s. 7d., against 8s. 2½d. and 7s. 7d.; Devons, 8s. 1½d. and 7s. 4d., against 8s. 2d. and 7s. 5½d.; and Polled Scots, 8s. 4½d. and 8s. 0½d., against 8s. 3½d. and 7s. 8½d. These figures refer to the average prices realised in about twenty English markets only. The trade in Scottish markets has been somewhat better than in the English. The Metropolitan market was closed on the 10th and 17th owing to the outbreak of foot-and-mouth disease at Hounslow.

Veal Calves.—There was a further decline in the average value of fat calves in about twenty-five of the principal British markets. It was only a fraction over 8d. and 7d. per lb. for first and second quality.

Fat Sheep.—The sheep trade cannot be said to have improved during July, but in the circumstances it could scarcely have been expected to do so, for the weather and conditions regarding green fodder crops have naturally affected the trade quite as severely as that for beef. In spite of this fact, however, actual values have been maintained, and there is little doubt that a change of weather would immediately strengthen the position of sellers and probably raise prices, at least to some extent.

The average values of Downs and Longwools were almost exactly the same as in June. Downs averaged 7½d. per lb. for first, 6½d. for second, and 5½d. for third quality, and Longwools, 6½d., 5½d., and 4½d. The variation in prices at different markets noticed last month was again observable, and in the last week we find that while Downs were fetching 8d. per lb. at Newcastle, they were only worth 6½d. at Hereford, Leeds, Shrewsbury, and Wakefield, a difference of about 6s. per head. While Islington market was closed there were over 3,000 sheep sent up for sale outside, and as the usual buyers in the suburban towns were debarred from purchasing, very poor prices were realised, sales being very difficult.

Fat Lambs.—The value of fat lambs has steadily fallen during the month at the rate of ¼d. per lb. per week, and the fall in the averages as compared with those of June was 1d. per lb. on first and ¾d. on second quality. The general averages in about forty British markets were a fraction over 9d. and 8½d. respectively.

Fat Pigs.—There was very little change in the value of fat pigs, but prime small weights declined 1d. per 14 lb. on the monthly average. In about twenty-seven British markets, bacon pigs averaged 6s. 4½d. and 5s. 9½d. per stone for first and second quality. The average price of prime bacon pigs in July, 1910, was 8s. per stone. The pig "shortage" may therefore be considered as a thing of the past.

Carcass Beef—British.—In comparison with other classes of beef, Scotch sides have been in fair request, but the average price was scarcely so high as in June. Short sides of best quality have made from 6½d. to 7d. per lb., and whole sides averaged 6½d. and 6d. for first and second quality in the London market. English beef—almost a negligible quantity—averaged 5½d. and 5¾d. for first and second quality.

Port-killed Beef.—There have been fair supplies of Deptford-killed

American beef, which have met a steady demand at $5\frac{3}{4}d.$ per lb. for the best and $5\frac{1}{2}d.$ for second quality.

Chilled Beef.—United States chilled has been forward in such small quantities as to be scarcely worth quoting, but Argentina has kept the market more than well supplied. This article, unlike "hard" or frozen beef, has to be sold at what it will fetch, and the morning quotations have often during this month borne no relation to the prices accepted, perforce, later in the day. The highest price for best hind-quarters was $4\frac{3}{4}d.$ per lb., and the lowest $3\frac{1}{4}d.$, while the value of forequarters has been an unknown quantity. On the last Wednesday they were quoted at $1\frac{3}{4}d.$ per lb.; and a few days previously a salesman offered to clear out at $1\frac{1}{2}d.$; but the offer was refused, although the meat was sound.

Frozen Beef.—This article was held back, and transactions were almost nominal. Hindquarters were quoted at 2s. 2d. to 2s. 5d. per 8 lb. stone.

Carcass Mutton—Fresh Killed.—The average prices were: Scotch, 7d. and $6\frac{1}{2}d.$; English, $6\frac{1}{4}d.$ and $5\frac{3}{4}d.$; and Dutch, 6d. and $5\frac{5}{8}d.$ per lb. for first and second quality, in the London Central Market.

Carcass Lamb.—There were good supplies of Scottish lamb, which is now the most valuable, owing to its small size. All British lamb has sold very slowly at falling prices. It has ranged in London from $8\frac{1}{2}d.$ at the beginning to $7\frac{1}{2}d.$ at the end of the month, averaging 8d. and $7\frac{1}{2}d.$ per lb. for the first and second quality, but much has been sold at far less money. The finest New Zealand has fetched $5\frac{1}{4}d.$ per lb.

Frozen Mutton.—Frozen mutton lost most of its recent advance, declining $\frac{1}{2}d.$ per lb. during the month. The best New Zealand averaged under 4d. per lb., and Argentine and Australian about $3\frac{1}{2}d.$

Veal.—The trade was irregular. In the third week choice English fetched 8d. per lb., and the next only 7d. The average for the month was $7\frac{1}{2}d.$ for prime and $6\frac{3}{8}d.$ for second quality. Lower qualities sold at extremely low rates.

Pork.—A very small trade, but some business passing each week. Best English varied from $5\frac{1}{2}d.$ to 6d. per lb., and Dutch $\frac{1}{4}d.$ less.

THE PROVISION TRADE IN JULY.

HEDLEY STEVENS.

Bacon.—The month of July opened with business quiet; dealers had bought fairly heavily for the holidays, and consequently had their stocks to work upon. The continuance of the hot weather, although increasing the consumption, also caused dealers to keep their stocks as low as possible, in order to prevent the possibility of losses through depreciation of the quality of their holdings from the effects of the weather. Long sides fluctuated during the month, and the closing prices showed a slight fall. The fine summer weather experienced throughout July caused a good demand for all descriptions of hams, and although prices eased a little after the Coronation demand had been filled, the losses had been more than covered by the end of the month.

Arrivals from some countries continue to show an increase over last year, but they are still below the average of recent years. The demand in America was good for all cured meats, that country having also experienced very hot weather. In consequence the prices asked for shipment were high, and importers considered them too dear to warrant their taking the risk of making purchases of any quantity for August and September shipments. During July the prices for American hogs fluctuated from \$6.15 to \$7.35, against \$8.20 to \$9.30 last year, and \$7.20 to \$8.25 two years ago. The quantities marketed continue to increase. The arrivals from Canada were only moderate, and prices kept steady until the end of the month, when they were a little easier.

English pigs were in moderate supply at about unchanged prices on the month.

Cheese.—The market during the past month was very puzzling to dealers generally. There was a fair consumptive demand, and the Canadian factorymen, being aware of the hot dry weather prevailing in this country, and consequent shrinkage in the make of cheese, have advanced their shipping prices, so that at the end of July as high as 60s. c.i.f. was asked for fancy Belleville section goods. This price is an unusually high one so early in the season for cheese made during the month of July.

The receipts of cheese into Montreal from May 1st to July 15th were 639,202 boxes, against 677,308 for the same period last year. The estimated stocks of Canadian cheese in this country on July 31st at the three principal distributing centres (London, Liverpool, and Bristol) were 214,000 boxes, against 274,000 at the same time last year, and 216,000 two years ago. The stock of New Zealand cheese was 2,600 crates in London and Bristol, against 8,500 last year. In the United States of America prices were around those current in Canada, and a few desirable lots were exported.

The dry weather has seriously curtailed the make of English cheese, more especially in the west, where there have been longer periods without rain. There was more marketed in Lancashire and Cheshire than in any of the other cheese-making districts, but the quality was irregular, and comparatively low prices were accepted in order to effect a clearance.

Butter.—There was a fair demand for this article, and with the continued dry weather prices increased from 5s. to 6s. per cwt. on the month.

Siberia is still experiencing very hot weather, and arrivals from that country were less. Australians moved steadily out of cold stores at advancing prices, the demand being mostly for best selections. New Zealand butter was in small supply. Shipments continued to arrive from Canada, but the quantities were not large, although in excess of the last two years. From May 1st to July 15th this year the quantity shipped to England and Scotland amounted to 25,198 packages, against 5,216 last year, and 2,454 in 1909. The shipping price at the end of the month was around 112s. c.i.f. United States butter was above an export basis. Irish butter advanced steadily on the month. On account of the hot weather the make shrunk considerably; the shortage is variously estimated at from 30 to 50 per cent.

Eggs.—Prices are mostly easier on the month, brought about by the hot weather. To effect sales of some imported parcels (chiefly from Russia) affected by the heat, some very low prices have been accepted.

THE FRUIT AND VEGETABLE MARKETS IN JULY.

W. W. GLENNY.

Strawberries.—The drought materially hastened the strawberry crop, and fruit came to market hurriedly, which depressed prices on several occasions. The plants were parched, and late gatherings were of smaller size than usual. Large, well coloured parcels made 2s. 6d. to 3s. 6d. per peck. Quality and flavour were lacking in many instances owing to want of moisture.

Cherries.—Prices have been firm throughout the month. Imported consignments came from France first, and some were received from Belgium; but the liberal supplies that often arrive from Stade on the Elbe were lacking. Prices have varied from 14s. to 16s. per half-bushel for the best varieties of English produce, such as Early Rivers, Elton, Napoleon, &c., with lower figures for common kinds; while French and Flemish cherries were at various prices from 4s. 6d. to 10s. per half-bushel.

Apples.—A brisk demand has ruled for South Australian and Tasmanians in cases (40 lb. weight). Cox's Orange Pippins and Cleopatras sold for 14s. to 16s., others, such as Worcester Pearmain, and Sturmer Pippins, averaged nearly 10s. per case, but were cheaper at the close of the month.

English Juliens, Suffields, Gladstones, Quarrendens, Beauty of Bath, Dominoes, Ecklinvilles, are now on sale at prices varying from 4s. 6d. per half-bushel for Ecklinvilles down to 1s. 9d. for Juliens, according to quality and size. Dessert and culinary apples began to arrive freely during the last week in July, though drought is having a serious effect in many orchards.

Currants have met with a good demand, which has encouraged importers to purchase both black and red; these come to market in trays of about 10 lb. net, and sell for from 2s. 6d. to 4s. per tray. Black currants are generally the dearer, and home-grown ones have fetched 7s. to 8s. a half-bushel, against 4s. to 5s. for fine red ones.

Grapes.—The price of grapes has been low. Best Muscats are worth from 2s. 6d. to 4s., while Canon Hale are worth 5s. per lb. for those of quality and size.

Peaches and Nectarines.—These have been in request, more especially since the heat has prevailed. Goodwood made a special call for these luxuries, and they were sold for the occasion at capital prices; English peaches realised 12s. to 16s. per dozen; while nectarines were quoted at from 12s. to 28s. per dozen, according to condition.

Plums.—The French have sent some useful culinary plums of various qualities, the price averaging 5s. per half-bushel; while English Rivers, Orleans, and Royals have ranged from 4s. to 9s. per half-bushel, the last mentioned being highest in value.

Greengages of the finest grade from Spain are well received at 1s. 6d. to 2s. 6d. for forty, packed neatly in small handy boxes. French 'gages in half-bushels realise between 6s. and 10s. each basket, while the same measure of Spaniards move between 10s. and 14s. per half-bushel, and are of fine quality and ripeness.

Gooseberries have met with a fair sale throughout the month at 2s. 6d. to 3s. per half-bushel, but they were cheaper towards the end of the month.

Raspberries have proved a short crop, and the jam makers have had to pay over 30s. per cwt. in many instances, while the general trade price has moved between 4d. and 8d. per lb., according to supply.

Tomatoes.—There is a demand for French tomatoes, as the home supply has fallen off a little. Best home-grown realise 3s. to 3s. 6d. per dozen lb., while Guernsey are a trifle cheaper.

Cucumbers.—Trade has been steady throughout the month, and fine, straight fruit has met with a ready sale at 2s. 6d. to 3s. per doz.

Marrows.—This commodity falls in value to a minimum when outdoor produce comes to market in van loads. Prices consequently fell from 3s. 6d. a dozen at the commencement of the month to a 1s. and 6d. a dozen at the close. Vegetable marrows are not available for pickle as cucumbers are, so when they are abundant there is a slump.

Beans.—Kidney dwarf beans are worth about 2s. 6d. per half-bushel, and scarlet runners which began at 6s. per bushel are now worth 3s. 6d. to 5s. Bloom drops off in drought, and scarlet runners in many fields have neither bloom nor fruit.

Peas.—These favourite vegetables have been far from plentiful under a scorching sun without moisture. Choice varieties like Duchess of Albany, Alderman, Autocrat, &c., have made 5s. and 6s. per bushel, while plainer varieties poorly podded have sold for 2s. per bushel the same day.

Potatoes.—The close of June finishes up the old-potato season for practical purposes, as markets are furnished with the new crop. July began with home-grown supplies from southern counties at from 4s. 6d. to 6s. 6d. per cwt., Channel Island at 5s. to 5s. 6d., French at 4s. to 5s., Canary at 9s. per cwt., Lisbon at about 4s. 3d. per box. The close of the month finds the trade rather easier, English best 5s., second quality 4s., Channel Island and French 3s. 9d. to 4s. per cwt. Imports from other sources have almost ceased.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES OF LIVE STOCK in ENGLAND and SCOTLAND
in the Month of July, 1911.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 4	8 0	39 2	36 5
Herefords	8 4	7 7	—	—
Shorthorns	8 0	7 4	38 4	35 8
Devons	8 1	7 4	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	8	7½	8½	7
Sheep:—				
Downs	7½	6½	—	—
Longwools	6½	5½	—	—
Cheviots	8	7½	7½	6¾
Blackfaced	7¾	7	7½	6½
Cross-breds	7½	6½	7¾	6¾
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	6 5	5 10	6 3	5 6
Porkers	6 10	6 4	6 7	5 6
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	21 17	18 3	22 2	18 7
„ —Calvers ...	21 19	18 0	19 2	16 11
Other Breeds—In Milk ...	19 15	17 11	19 12	16 1
„ —Calvers ...	15 10	13 15	19 3	15 17
Calves for Rearing	2 8	1 15	2 11	1 17
Store Cattle:—				
Shorthorns—Yearlings ...	9 14	8 6	9 17	8 18
„ —Two-year-olds ...	14 2	11 16	14 0	11 17
„ —Three-year-olds ...	16 0	14 10	—	14 0
Polled Scots—Two-year-olds	—	—	14 5	14 2
Herefords—	—	12 10	—	—
Devons—	13 10	11 13	—	—
Store Sheep:—				
Hoggs, Hoggets, Togs, and				
Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	31 6	23 7	—	—
Scotch Cross-breds ...	—	—	—	—
Store Pigs:—				
8 to 10 weeks old	18 5	14 3	19 9	16 3
12 to 16 weeks old	28 2	20 10	29 3	21 9

* Estimated carcass weight.

† Live weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of July, 1911.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	Quality.	Birming- ham.	Liver- pool.	Lon- don.	Man- chester.	Edin- burgh.	Glas- gow.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—							
English	1st	54 0	—	53 6	55 0	58 6*	56 6*
	2nd	50 0	—	51 6	52 6	54 0*	53 6*
Cow and Bull	1st	46 6	45 0	45 6	48 0	48 6	47 0
	2nd	42 0	39 6	41 6	43 6	43 6	42 6
U.S.A. and Cana- dian :—							
Port Killed	1st	53 0	53 6	53 6	53 6	—	54 0
	2nd	49 6	49 6	51 0	52 0	—	52 0
Argentine Frozen—							
Hind Quarters...	1st	33 0	32 0	32 6	32 0	34 0	33 0
Fore „	1st	23 6	23 6	22 0	24 0	24 0	23 0
Argentine Chilled—							
Hind Quarters...	1st	36 6	38 0	36 0	38 0	38 6	39 0
Fore „	1st	24 0	24 0	21 6	24 6	24 6	25 0
Australian Frozen—							
Hind Quarters...	1st	32 6	31 6	32 6	31 6	—	32 0
Fore „	1st	23 6	21 6	22 0	22 0	—	22 6
VEAL :—							
British	1st	60 6	68 0	69 0	66 6	—	72 6
	2nd	52 6	63 0	59 6	62 0	—	65 6
Foreign	1st	—	—	67 6	—	69 0	65 6
MUTTON :—							
Scotch	1st	—	70 0	64 6	67 6	67 0	68 0
	2nd	—	65 6	60 6	63 0	59 0	57 0
English	1st	60 6	63 0	58 6	66 6	—	—
	2nd	52 0	56 6	53 0	60 0	—	—
Argentine Frozen ...	1st	36 0	35 6	33 6	35 6	36 0	34 6
Australian „	1st	35 0	34 0	32 6	34 0	—	32 0
New Zealand „ ...	1st	—	—	36 6	—	—	36 0
LAMB :—							
British	1st	—	71 6	76 0	73 0	70 0	81 6
	2nd	71 0	65 6	70 0	67 6	58 6	71 0
New Zealand	1st	51 6	49 6	49 0	50 0	51 6	50 6
Australian	1st	46 6	44 6	43 6	44 6	—	43 6
Argentine	1st	45 6	44 6	—	44 6	—	43 6
PORK :—							
British	1st	56 0	62 6	54 0	63 0	53 6	57 6
	2nd	51 6	55 0	48 0	58 6	46 6	54 6
Foreign	1st	—	—	51 6	—	—	—

* Scotch.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1909, 1910 and 1911.

Weeks ended (<i>in</i> 1911).	WHEAT.						BARLEY.						OATS.					
	1909.		1910.		1911.		1909.		1910.		1911.		1909.		1910.		1911.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 7 ...	32	9	33	6	30	5	26	11	24	11	23	11	17	5	17	2	17	0
" 14 ...	32	8	33	8	30	8	27	1	24	11	23	10	17	5	17	7	17	2
" 21 ...	33	2	33	9	30	11	27	3	24	11	24	4	17	8	17	6	17	4
" 28 ...	33	0	33	6	30	11	27	6	25	0	24	5	17	9	17	4	17	3
Feb. 4 ...	33	4	33	7	30	9	27	7	24	10	24	5	17	10	17	7	17	5
" 11 ...	33	8	33	4	30	5	27	8	24	9	24	6	17	11	17	11	17	5
" 18 ...	34	1	33	0	30	3	27	11	24	6	24	7	18	0	18	0	17	6
" 25 ...	34	5	32	7	30	2	28	0	24	2	24	9	18	0	17	10	17	7
Mar. 4 ...	34	10	32	7	30	0	27	11	24	6	25	0	18	2	18	1	17	5
" 11 ...	35	8	32	6	30	1	28	4	24	1	25	0	18	2	18	0	17	5
" 18 ...	35	9	32	6	30	1	28	0	23	6	24	11	18	5	18	0	17	6
" 25 ...	36	0	32	9	30	2	28	0	23	7	25	0	18	6	17	11	17	5
Apl. 1 ...	36	5	33	0	30	3	27	10	23	8	24	11	18	8	18	0	17	5
" 8 ...	37	4	33	6	30	4	28	0	23	1	24	7	18	10	17	11	17	7
" 15 ...	38	7	33	7	30	3	27	8	23	5	25	2	19	2	18	3	18	3
" 22 ...	41	4	33	7	30	4	28	2	23	0	25	5	19	9	18	3	17	10
" 29 ...	42	5	33	0	30	11	27	10	22	10	25	5	20	0	18	3	18	3
May 6 ...	40	9	32	6	31	4	27	7	22	7	25	7	20	3	18	2	18	6
" 13 ...	41	6	32	1	31	8	27	3	22	0	25	1	20	6	18	1	19	0
" 20 ...	42	8	31	10	32	6	27	0	21	8	25	4	20	11	17	8	19	2
" 27 ...	42	6	31	3	32	8	26	3	21	4	25	0	21	0	17	10	19	5
June 3 ...	43	1	30	2	32	5	25	7	21	8	24	10	21	3	17	10	19	5
" 10 ...	42	11	29	1	32	4	26	10	20	9	25	7	21	4	17	10	19	7
" 17 ...	42	7	29	0	32	3	26	10	18	11	23	11	21	6	18	0	19	8
" 24 ...	42	8	29	4	31	11	27	2	20	1	23	9	21	7	17	9	19	10
July 1 ...	42	9	29	9	31	10	27	2	19	11	24	5	21	9	17	7	19	9
" 8 ...	43	0	30	4	32	1	26	4	19	5	25	10	21	8	17	4	19	9
" 15 ...	43	3	31	1	32	3	26	10	21	3	25	10	21	9	17	7	19	11
" 22 ...	44	0	31	11	32	5	27	4	19	9	24	3	22	5	17	5	19	5
" 29 ...	43	5	33	5	32	5	24	6	20	10	23	8	22	2	18	1	19	7
Aug. 5 ...	44	9	33	9	32	0	27	4	20	5	24	4	22	11	18	3	18	2
" 12 ...	44	9	33	5			24	9	20	4			21	8	18	0		
" 19 ...	41	6	32	11			23	11	20	11			19	8	17	11		
" 26 ...	38	5	32	7			24	7	20	10			19	4	17	2		
Sept. 2 ...	37	2	32	2			26	3	22	10			19	6	17	2		
" 9 ...	34	11	31	11			26	1	23	3			18	5	17	2		
" 16 ...	33	6	30	11			26	5	24	3			17	9	16	6		
" 23 ...	32	9	30	2			26	8	24	2			17	7	16	3		
" 30 ...	32	2	30	1			26	9	24	4			17	2	16	4		
Oct. 7 ...	31	8	30	1			26	9	24	7			17	0	16	3		
" 14 ...	31	4	30	2			27	0	25	1			17	0	16	2		
" 21 ...	31	8	30	4			27	7	25	3			16	11	16	1		
" 28 ...	31	10	30	4			27	9	25	4			17	0	16	2		
Nov. 4 ...	32	5	30	4			27	9	25	6			17	0	16	2		
" 11 ...	31	5	29	11			27	7	25	4			17	1	15	11		
" 18 ...	32	7	29	8			27	0	25	1			17	4	16	1		
" 25 ...	33	0	29	11			26	8	24	10			17	3	16	4		
Dec. 2 ...	33	3	30	6			26	1	24	7			17	4	16	7		
" 9 ...	33	3	30	9			25	7	24	3			17	3	16	9		
" 16 ...	33	2	30	7			25	3	23	9			17	4	16	10		
" 23 ...	33	1	30	7			25	2	23	10			17	4	16	9		
" 30 ...	33	3	30	5			25	1	23	9			17	4	16	9		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and BRESLAU.

	WHEAT.		BARLEY.		OATS.	
	1910.	1911.	1910.	1911.	1910.	1911.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
France: June	41 10	46 8	25 5	27 4	21 4	22 9
July	42 10	43 8	25 4	26 8	21 1	22 4
Paris: June	42 6	47 2	24 4	27 0	20 6	23 11
July	45 6	43 8	23 6	26 6	21 7	23 4
Belgium: May	35 4	34 11	23 8	24 11	20 1	21 10
June	31 11	34 10	22 8	27 4	19 8	21 10
Germany: May	44 0	42 5	24 10	29 2	20 7	24 2
June	40 5	42 7	24 3	28 8	20 1	25 0
Berlin: May	46 1	44 4	—	—	20 10	23 2
June	42 9	44 4	—	—	20 5	23 3
Breslau: May	41 0	39 7	25 4* 23 3†	—* 24 9†	19 6	22 7
June	39 7	40 5	25 4* 22 11†	—* 24 9†		

* Brewing.

† Other.

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of July, 1910 and 1911.

	WHEAT.		BARLEY.		OATS.	
	1910.	1911.	1910.	1911.	1910.	1911.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
London... ..	32 2	32 11	21 5	25 3	19 2	20 7
Norwich	30 9	32 1	18 4	—	16 10	19 6
Peterborough	31 0	31 6	19 2	—	17 2	18 5
Lincoln... ..	31 4	32 4	19 5	—	17 7	18 6
Doncaster	30 3	31 8	21 5	—	17 11	19 4
Salisbury	31 0	31 9	19 10	22 9	17 8	20 1

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of July, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Bristol.		Liverpool.		London.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British ...	14 0	13 0	—	—	13 0	12 0	14 0	—
Irish Creamery	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
„ Factory	111 6	108 0	111 0	109 0	113 6	110 0	112 0	109 0
Danish ...	—	—	121 0	118 0	118 6	116 6	115 0	—
French ...	—	—	—	—	120 0	117 0	—	—
Russian ...	105 0	98 6	105 0	100 0	105 6	102 6	101 6	99 0
Canadian ...	112 6	109 6	111 6	109 6	—	—	111 6	—
Australian ...	106 0	103 6	—	—	108 6	105 0	—	—
CHEESE :—								
British—								
Cheddar ...	74 6	70 6	72 0	70 0	68 6	65 0	60 0	58 0
Cheshire ...	—	—	120 lb. 65 0	120 lb. 60 0	120 lb. 74 0	120 lb. 66 6	—	—
Canadian ...	57 6	56 0	per cwt. 58 6	per cwt. 56 6	per cwt. 59 6	per cwt. 58 0	58 0	—
BACON :—								
Irish ...	74 0	68 6	69 0	64 0	73 6	69 0	69 6	—
Canadian ...	65 6	63 0	64 0	60 6	65 6	63 6	—	—
HAMS :—								
Cumberland ...	—	—	—	—	106 0	98 0	—	—
Irish ...	—	—	—	—	106 0	99 6	102 6	99 6
American (long cut)	72 6	69 0	72 0	68 6	75 6	71 6	70 0	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ...	10 0	9 2	—	—	10 7	9 7	10 10	—
Irish ...	9 4	8 10	9 4	8 8	9 4	7 10	9 3	8 8
Danish ...	—	—	9 10	9 4	9 8	8 6	—	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Duke of York	—	—	86 6	80 0	106 6	86 6	—	—
Early Puritan	—	—	—	—	96 6	81 6	—	—
Other First	—	—	—	—	—	—	—	—
Earlies	—	—	75 0	66 6	96 6	81 6	91 6	—
HAY :—								
Clover ...	90 0	75 0	97 0	73 6	93 6	79 0	80 0	75 0
Meadow ...	77 6	60 0	—	—	83 6	62 6	—	—

DISEASES OF ANIMALS ACTS, 1894 to 1910.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	JULY.		SEVEN MONTHS ENDED JULY.	
	1911.	1910.	1911.	1910.
Swine-Fever:—				
Outbreaks	236	153	1,568	884
Swine Slaughtered as diseased or exposed to infection ...	3,258	1,506	18,235	8,014
Anthrax:—				
Outbreaks*	37	79	512	889
Animals attacked	47	97	639	1,078
Foot-and-Mouth Disease:—				
Outbreaks	6	1	7	1
Animals attacked	402	14	420	14
Glanders (including Farcy):—				
Outbreaks	10	33	114	211
Animals attacked	19	148	291	649
Sheep-Scab:—				
Outbreaks	—	11	303	326

* For 1910 the figures show the outbreaks reported, but for 1911 the outbreaks confirmed.

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	JULY.		SEVEN MONTHS ENDED JULY.	
	1911.	1910.	1911.	1910.
Swine-Fever:—				
Outbreaks	13	8	76	65
Swine Slaughtered as diseased or exposed to infection ...	408	212	1,382	1,553
Anthrax:—				
Outbreaks	1	1	6	5
Animals attacked	1	1	7	8
Glanders (including Farcy):—				
Outbreaks	—	—	2	1
Animals attacked	—	—	3	2
Sheep-Scab:—				
Outbreaks	3	8	245	341

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library. A list of these publications appeared in the *Journal* for October, November, and December, 1909.]

Agriculture, General and Miscellaneous—

Deutsche Landwirtschafts-Gesellschaft.—Arbeiten. Heft 187:—Betriebsverhältnisse der deutschen Landwirtschaft. Stück XII. (105 pp.)

[A. 28.] Heft 188:—Betriebsverhältnisse der deutschen Landwirtschaft. Stück XIII. (80 pp.) [A. 28.] Berlin: Paul Parey, 1911.

Maeso, C. M.—El Uruguay a Través de un Siglo.* (533 pp.) Montevideo, 1910. [A. 84.]

Ontario Department of Agriculture, Ontario Agricultural College.—Bull. No. 188:—Weeds of Ontario. (144 pp.) Toronto, 1911. [B. 20-3.]

Illinois Agricultural Experiment Station.—Circ. No. 149:—Part I. Results of Scientific Soil Treatment. Part II. Methods and Results of Ten Years' Soil Investigations in Illinois. (32 pp.) Urbana, Illinois, 1911. [B. 40-7.]

Iowa Agricultural Experiment Station.—Bull. No. 124:—A Centrifugal Method for the Determination of Humus. (368-385 pp.) Ames, Iowa, 1911. [B. 40-5.]

Wisconsin Agricultural Experiment Station.—Research Bull. No. 14:—Sulphur Requirements of Farm Crops in Relation to the Soil and Air Supply. (21 pp.) Madison, Wisconsin, 1911. [B. 40-9.]

U.S. Dept. of Agriculture, Bureau of Soils.—Bull. No. 71:—Soil Erosion. (60 pp.+xxxiii plates.) Washington, 1911. [B. 40-1.]

Hawaii Agricultural Experiment Station.—Press Bull. No. 30:—Killing Weeds with Arsenite of Soda. (15 pp.) Honolulu, 1911. [B. 20-3.]

Memoirs of the Geological Survey.—Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for 1910. (87 pp.) London: E. Stanford, 1911. 1s. [B. 36.]

Report of the Imperial Education Conference, 1911. [Cd. 5666.] (267 pp.) London: Wyman and Sons, 1911. 1s. [B. 44-3.]

Departmental Committee on Educational Endowments.—Vol. I.:—Report. [Cd. 5662.] (43 pp.) 5d. Vol. II.:—Minutes of Evidence, Appendices, and Index. [Cd. 5747.] (273 pp.) 2s. 3d. [B. 44-3.] London: Wyman and Sons, 1911.

Board of Trade, Exhibitions Branch.—Report on the Argentine Centennial Exhibitions, Buenos Aires, 1910. [Cd. 5677.] (69 pp.) London: Wyman and Sons, 1911. 7d. [A. 82.]

Rees, Bertha.—Longevity of Seeds and Structure and Nature of Seed Coat. (393-414 pp. and plates.) [Reprinted from Proc. Roy. Soc. Victoria, Vol. XXIII. (New Series), Part II.] Melbourne, 1911. [B. 18.]

Fry, Sir E., and Fry, Agnes.—The Liverworts, British and Foreign. (74 pp.) London: Witherby and Co., 1911. 2s. 6d. net. [B. 16-1.]

Fritsch, J.—The Manufacture of Chemical Manures. (339 pp.) London: Scott, Greenwood, 1911. 10s. 6d. net. [B. 26.]

Field Crops—

U.S. Dept. of Agriculture, Bureau of Plant Industry.—Bull. No. 209:—Grimm Alfalfa and its Utilisation in the North-west. (66 pp.) Washington, 1911. [C. 44-3.]

Deutsche Landwirtschafts-Gesellschaft.—Arbeiten. Heft 181:—Dreijährige Zuckerrüben-Anbauversuche 1907-1909. (192 pp.) Berlin: Paul Parey, 1911. [C. 34-3.]

- Wyoming Agricultural Experiment Station.*—Bull. No. 86 :—Potatoes. (20 pp.) [C. 26-3.] Bull. No. 87 :—Wyoming Forage Plants and their Chemical Composition—Studies No. 4. (152 pp.) [C. 44.] Laramie, Wyoming, 1911.
- Edinburgh and East of Scotland College of Agriculture.*—Report XXIII. :—Experiments in the Improvement of Old Pasture, 1908-1910. (8 pp.) [C. 42-9.] Report XXIV. :—Experiments with Potatoes, 1910. (10 pp.) [C. 26-3.] Edinburgh, 1911.
- Nebraska Agricultural Experiment Station.*—Bull. No. 120 :—Alfalfa Management. (13 pp.) Lincoln, Nebraska, 1911. [C. 44-3.]

Horticulture—

- Paddock, W., and Whipple, O. B.*—Fruit Growing in Arid Regions, an Account of Approved Fruit-Growing Practices in the Inter-Mountain Country of the Western United States. (395 pp.) New York: The Macmillan Co., 1910. 6s. 6d. net. [D. 6; D. 28-1.]
- Sanders, T. W.*—Shady Gardens. ["One and All" Garden Books, No. 32.] (20 pp.) London: Agricultural and Horticultural Assn., Ltd., 1911. 1d. [D. 26-1.]
- U.S. Dept. of Agriculture.*—Farmers' Bull. No. 426 :—Canning Peaches on the Farm. (26 pp.) [D. 38-1.] No. 433 :—Cabbage. (23 pp.) [D. 20.] No. 434 :—The Home Production of Onion Seed and Sets. (24 pp.) [D. 20.] Washington, 1911.
- U.S. Dept. of Agriculture, Bureau of Plant Industry.*—Bull. No. 204 :—Agricultural Explorations in the Fruit and Nut Orchards of China. (62 pp.) [D. 14.] Washington, 1911.
- Pennsylvania Agricultural Experiment Station.*—Bull. No. 106 :—The Apple in Pennsylvania: Varieties, Planting, and General Care. (19 pp.) Centre County, Pennsylvania, 1910. [D. 30.]
- Wisconsin Agricultural Experiment Station.*—Bull. No. 201 :—Planting the Commercial Orchard. (34 pp.) Madison, Wisconsin, 1911. [D. 30.] [This bulletin deals with apple trees only.]
- Storrs Agricultural Experiment Station.*—Bull. No. 66 :—Apple Growing in New England, IV.—Orchard Management. (211-263 pp.) Storrs, Connecticut, 1911. [D. 30.]
- U.S. Dept. of Agriculture, Bureau of Chemistry.*—Bull. No. 140 :—Enological Studies.—The Occurrence of Sucrose in Grapes. The Sugar and Acid Content of Different Varieties of Grapes, Sampled at Frequent Intervals during Ripening and at Full Maturity. (24 pp.) Washington, 1911. [D. 48.]
- Cornell Agricultural Experiment Station.*—Bull. No. 292 :—Cauliflower and Brussels Sprouts on Long Island. (227-286 pp.) Ithaca, New York, 1911. [D. 20.]
- Missouri Agricultural Experiment Station.*—Bull. No. 97 :—Co-operation among Fruit Growers. (58 pp.) Columbia, Missouri, 1911. [D. 28-3; N. 4-3.]
- Belletre, G.*—Le Marché Anglais des Fruits et la Co-operation des Agriculteurs en Vue de l'Exportation. (231 pp.) Paris: C. Amat, n.d. [D. 4; N. 4-7.]
- Speer, A. E.*—Annual and Biennial Garden Plants. Their Value and Uses, with Full Instructions for their Cultivation. (256 pp.) London: John Murray, 1911. 7s. 6d. net. [D. 26-1.]

Plant Diseases—

- Osborn, T. G. B.*—*Spongospora subterranea* (Wallroth), Johnson. [Annals of Botany, Vol. XXV., No. XCVIII., April, 1911.] (327-341 pp. and plate.) [E. 60-37.]

Nebraska Agricultural Experiment Station.—Bull. No. 119:—Spraying as an Essential Part of Profitable Apple Orchardng. (26 pp.) Lincoln, Nebraska, 1911. [E. 20-5.]

U.S. Dept. of Agriculture, Bureau of Plant Industry.—Bull. No. 213:—Crown-Gall of Plants: Its Cause and Remedy. (215 pp.) [E. 60-23.] Washington, 1911

U.S. Dept. of Agriculture, Bureau of Entomology.—Technical Series, No. 16:—Papers on Coccidæ or Scale Insects. Part IV.—Catalogue of Recently Described Coccidæ, III. (59-74 pp.) Technical Series, No. 20:—Technical Papers on Miscellaneous Forest Insects. Part III.—A Revision of the Powder-Post Beetles of the Family Lyctidæ of the United States and Europe. (107-138 pp.) [E. 40-3.] Part IV.—Studies in the Sawfly Genus *Hoplocampa*. (139-148 pp.+plates.) [E. 40-51.] Washington, 1911.

Cornell Agricultural Experiment Station.—Bull. No. 283:—The Control of Insect Pests and Plant Diseases. (463-498 pp.) [E. 20-3.] Bull. No. 288:—Spray Injury Induced by Lime-Sulphur Preparations. (101-137 pp.) [E. 20-5.] Bull. No. 289:—Lime-Sulphur as a Summer Spray. (139-162 pp.) [E. 20-5.] Bull. No. 290:—Studies of the Fungicidal Value of Lime-Sulphur Preparations. (163-207 pp.) [E. 20-5.] Bull. No. 291:—The Apple Red Bugs. (211-225 pp.) [E. 40-51.] Bull. No. 293:—The Black Rot Disease of Grapes. (287-364 pp.+plates.) [E. 60-13.] Ithaca, New York, 1911.

Pethybridge, G. H., and Murphy, Paul A.—A Bacterial Disease of the Potato Plant in Ireland. [Proc. Roy. Irish Acad., Vol. XXIX., Section B, No. 1, 1911.] (37 pp. and plates.) Dublin, 1911. [E. 60-37.]

French, C.—A Handbook of the Destructive Insects of Victoria, with Notes on the Methods of Prevention and Extirpation. Part V. (169 pp. and plates.) Melbourne, 1911. 2s. 6d. [E. 14.]

Indian Forest Memoirs, Forest Zoology Series.—Vol. II., Part I.:—On some important Insect Pests of the Coniferæ of the Himalaya, with Notes on some Insects Predaceous and Parasitic upon them. (69 pp. and plates.) Calcutta, 1911. 7s. [E. 40-13; E. 40-9.]

Janini, Rafael J.—Datos Reunidos para la Reconstitución de los Viñedos Valencianos Destruídos por la Filoxera.* (26 pp. and charts.) Valencia, 1911. [E. 6; E. 40-37.]

Sedgwick, S. N.—Butterflies and How to Identify Them. (63 pp.) London: C. H. Kelly, 1911. 1s. net. [E. 40-3.]

Live Stock—

Wisconsin Agricultural Experiment Station.—Circ. of Information No. 21:—Distribution of Licensed Stallions in Counties of Wisconsin. (106 pp.) Madison, Wisconsin, 1911. [F. 46.]

Nebraska Agricultural Experiment Station.—Bull. No. 117:—Growing Feeder Steers in Western Nebraska. (54 pp.) Lincoln, Nebraska, 1911. [F. 68-1.]

Gossett, Adelaide L. J.—Shepherds of Britain. Scenes from Shepherd Life Past and Present. (331 pp.) London: Constable and Co., 1911. 7s. 6d. net. [F. 76.]

U.S. Dept. of Agriculture, Bureau of Animal Industry.—Circ. No. 178:—Breeding Horses for the United States Army. (13 pp.) Washington, 1911. [F. 64-9.]

Dairying and Food, General—

Canada, Dept. of Agriculture, Dairy and Cold Storage Branch.—Bull. No. 26:—Dairy Legislation. (16 pp.) Ottawa, 1910. [G. 20.]

Vincent, R.—On the Production of Pure Milk: An Account of the Methods Employed at the Infants' Hospital Farm. (22 pp.) London: P. S. King and Son, 1911. 6d. net. [G. 56-9.]

- Koning, C. J.*—Biologische und Biochemische Studien über Milch, Drittes (Schluss) Heft. (144 pp.) Leipzig: M. Heinsius Nachfolger, 1911. [G. 56-1.]
- Wisconsin Agricultural Experiment Station.*—Bull. No. 200:—The Selection of Feeds for Dairy Cattle. (17 pp.) [G. 50-7.] Circ. of Information No. 20:—The Control of Moisture in Cheese. (14 pp.) [G. 66-1.] Madison, Wisconsin, 1911.
- Ayrshire Cattle Milk Records Committee.*—Report on Milk Records for Season 1909. Record of 9,202 Cows. (313 pp.) Kilmarnock, 1910. [G. 56-7.]
- Storrs Agricultural Experiment Station.*—Bull. No. 65:—Butter Making on the Farm. (191-210 pp.) Storrs, Connecticut, 1911. [G. 60-1.]
- Colorado Agricultural Experiment Station.*—Bull. No. 163:—Farm Butter Making. (16 pp.) Fort Collins, Colorado, 1910. [G. 60-1.]
- U.S. Dept. of Agriculture, Bureau of Animal Industry.*—Circ. No. 171:—Fermented Milks. (131-161 pp.) [G. 56-1.] Circ. No. 179:—Cow-Testing Associations. (24 pp.) [G. 56-7.] Bull. No. 134:—The Estimation of Total Solids in Milk by the Use of Formulas. (31 pp.) [G. 56-3.] Washington, 1911.
- Canada, Dept. of Agriculture, Branch of Dairy and Cold Storage Commissioner.*—Bull. No. 29:—Notes for Factory Cheesemakers. (7 pp.) Ottawa, 1911. [G. 66-1.]
- Wisconsin Agricultural Experiment Station.*—Research Bull. No. 13:—Studies of the Protein Requirements of Dairy Cows. (175-216 pp.) Madison, Wisconsin, 1911. [G. 50-7.]

Veterinary Science—

- Wisconsin Agricultural Experiment Station.*—Circ. of Information No. 23:—A Catechism on Bovine Tuberculosis. (24 pp.) Madison, Wisconsin, 1911. [H. 54-7.]
- Local Government Board.*—Reports on Public Health and Medical Subjects, New Series, No. 53:—Further Reports (No. 4) on Flies as Carriers of Infection. (48 pp.) London: Wyman and Sons, 1911. 4d. [H. 50-1.]
- Cornell Agricultural Experiment Station.*—Bull. No. 285:—The Cause of "Apoplexy" in Winter-Fed Lambs. (37-46 pp.) Ithaca, New York, 1910. [H. 42-1; F. 76-1.]
- Colorado Agricultural Experiment Station.*—Bull. No. 162:—Rabies. (8 pp.) Fort Collins, Colorado, 1910. [H. 44.]
- U.S. Dept. of Agriculture, Bureau of Animal Industry.*—Circ. No. 169:—A Study of Surra found in an Importation of Cattle, Followed by a Prompt Eradication. (77-97 pp.) [H. 50-3.] Bull. No. 133:—The Determination of Nicotin in Nicotin Solutions and Tobacco Extracts. (22 pp.) [H. 28-7; C. 54.] Bull. No. 136:—The Diagnosis of Glanders by Complement Fixation. (31 pp.) [H. 34-3.] Washington, 1911.
- Departmental Committee on Swine Fever.*—Interim Report. Part II.:—Minutes of Evidence, Index and Appendix. [Cd. 5680.] (398 pp.) London: Wyman and Sons, 1911. 3s. 5d. [H. 40-3.]
- Deutsche Landwirtschafts-Gesellschaft.*—Arbeiten. Heft 189:—Studien über funktionelle Anpassung und über anatomische und physiologische Unterschiede zwischen warm- und kaltblütigen Pferden. (116 pp.) Berlin: Paul Parey, 1911. [H. 34-1; F. 64-1.]
- Illinois Agricultural Experiment Station.*—Bull. No. 149:—Tuberculosis of Farm Animals. (313-431 pp.) Urbana, Illinois, 1911. [H. 54-3.]

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